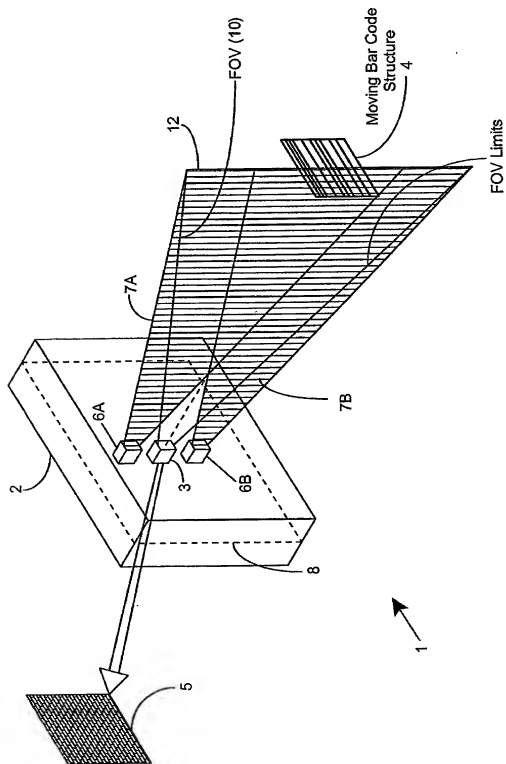


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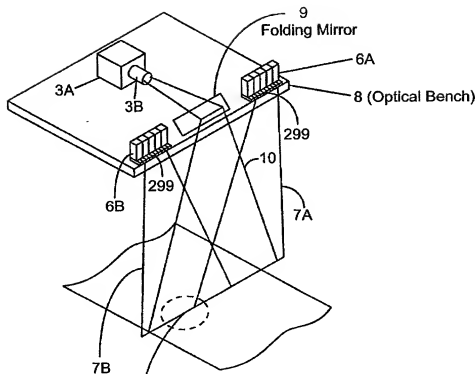


FIG. 1B1

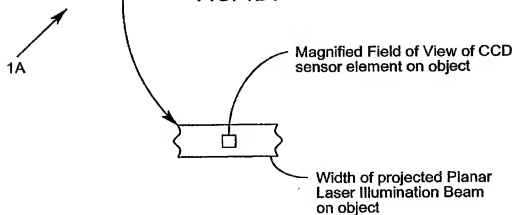


FIG. 1B3



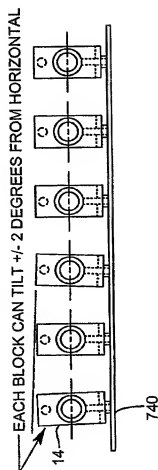


FIG. 1B4

VLD BLOCK CAN PITCH FORWARD FOR ALIGNMENT WITH OTHER VLD BEAMS

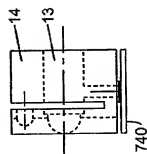


FIG. 1B5



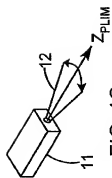


FIG. 1D

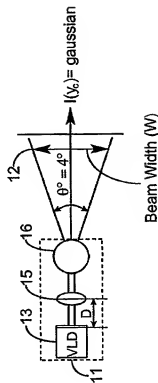
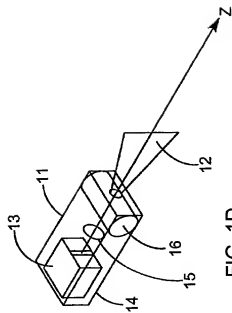


FIG. 1E2

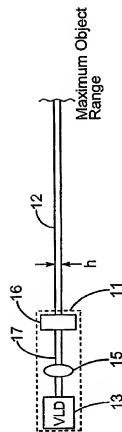


FIG. 1E2

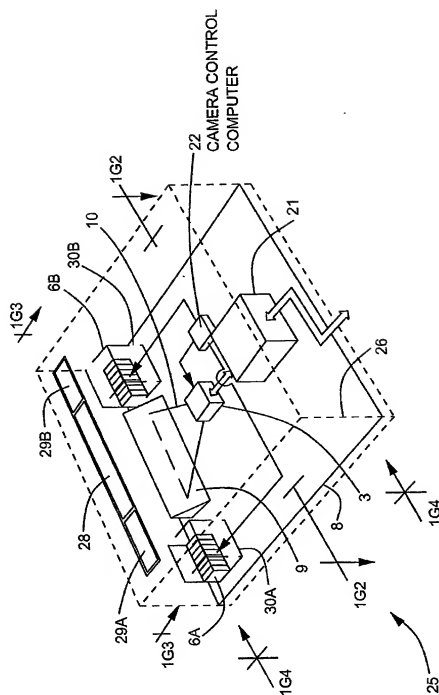


FIG. 1G1

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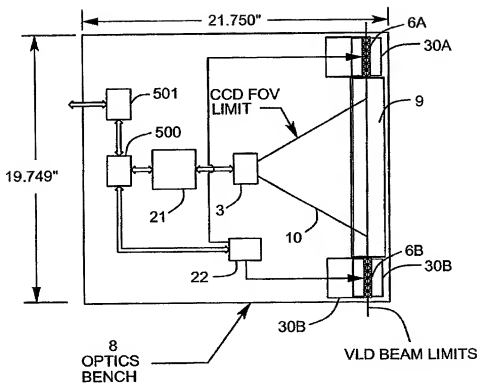


FIG. 1G2



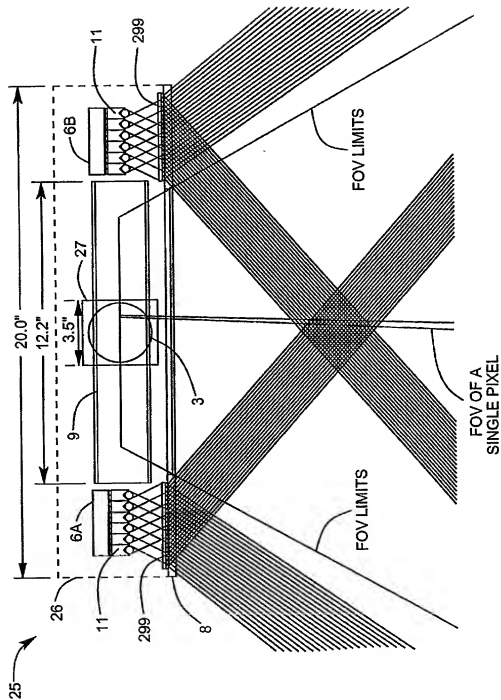


FIG. 1G3



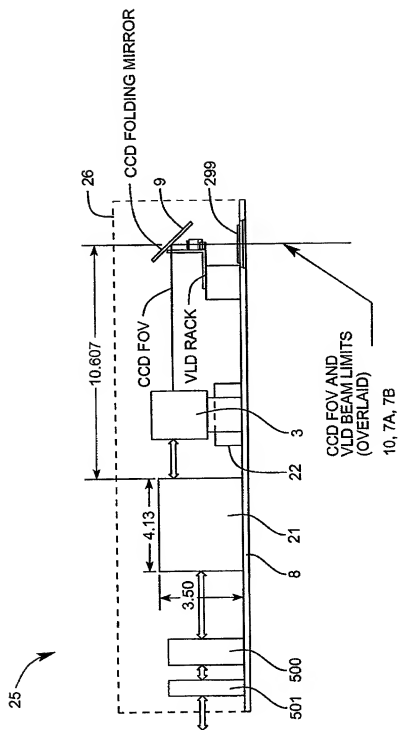


FIG. 1G4



10068803.100702

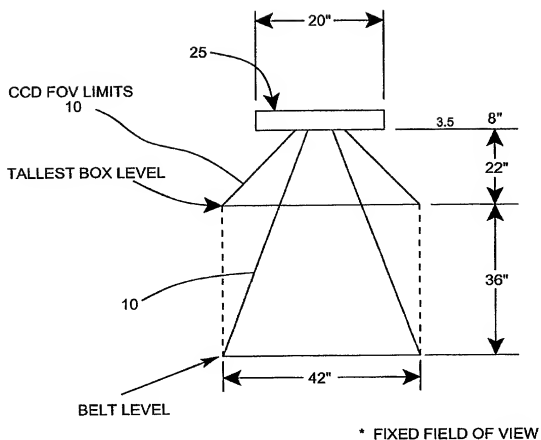


FIG. 1G5



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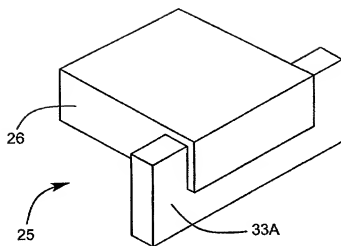


FIG. 1G6

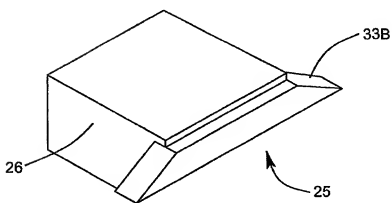


FIG. 1G7



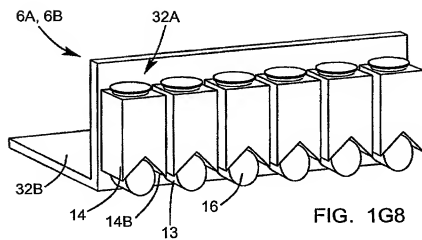


FIG. 1G8

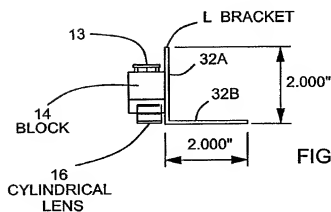


FIG. 1G9

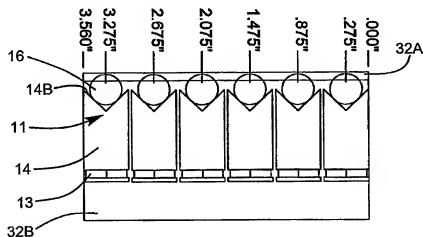


FIG. 1G10

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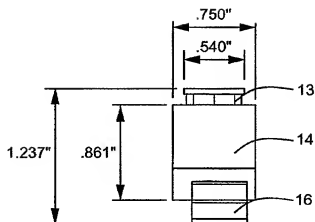


FIG. 1G11

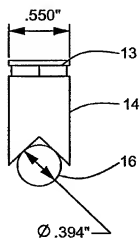


FIG. 1G12

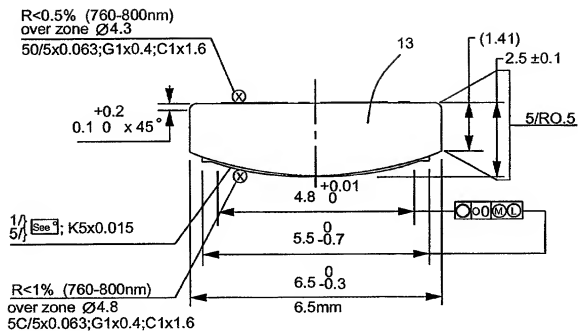


FIG. 1G13

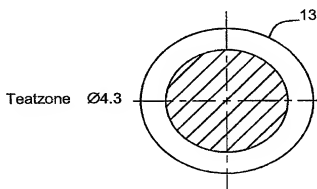


FIG. 1G14

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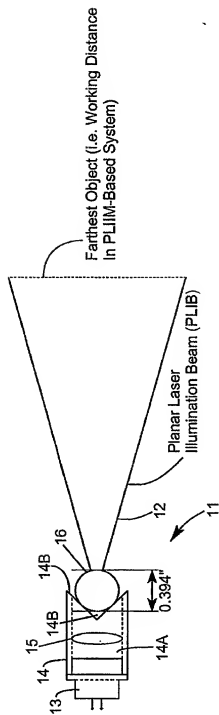


FIG. 1G15A

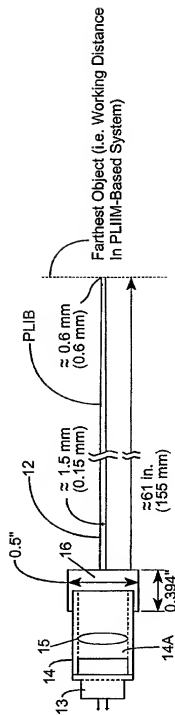


FIG. 1G15B

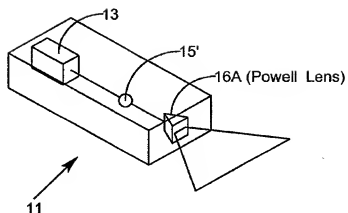


FIG. 1G16A

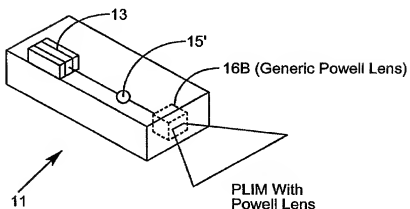


FIG. 1G16B

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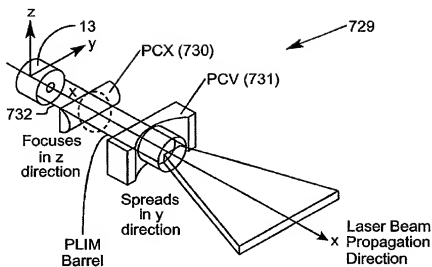


FIG. 1G17A

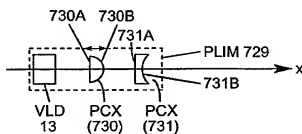


FIG. 1G17B

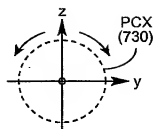


FIG. 1G17C

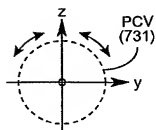


FIG. 1G17D

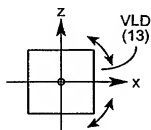


FIG. 1G17E

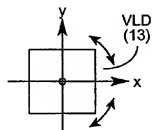


FIG. 1G17F

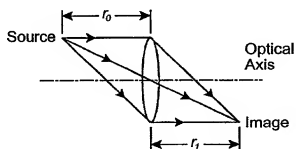


FIG. 1H1

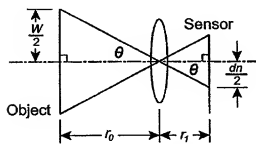


FIG. 1H2

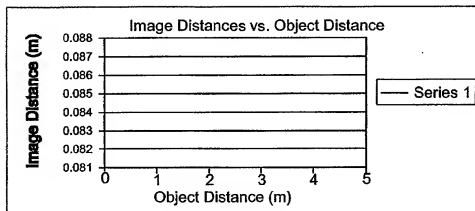


FIG. 1H3

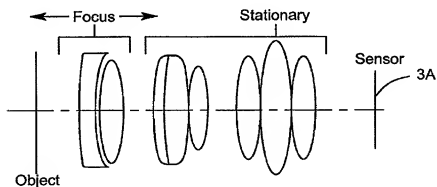


FIG. 1H4

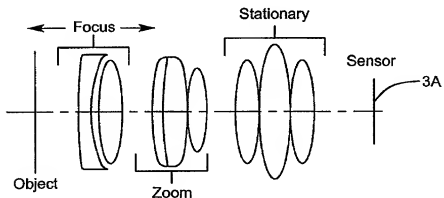


FIG. 1H5

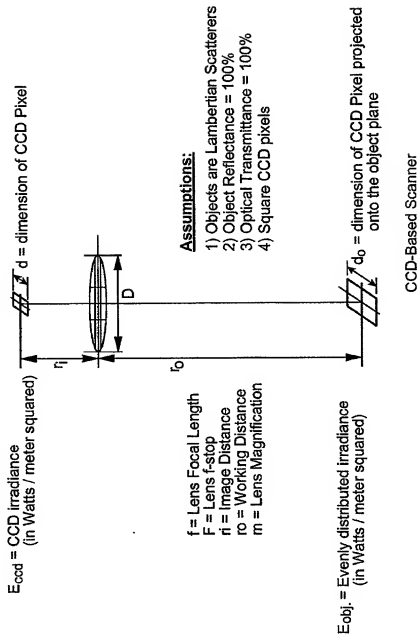


FIG. 1H6

(SPMF)



FIG. 111

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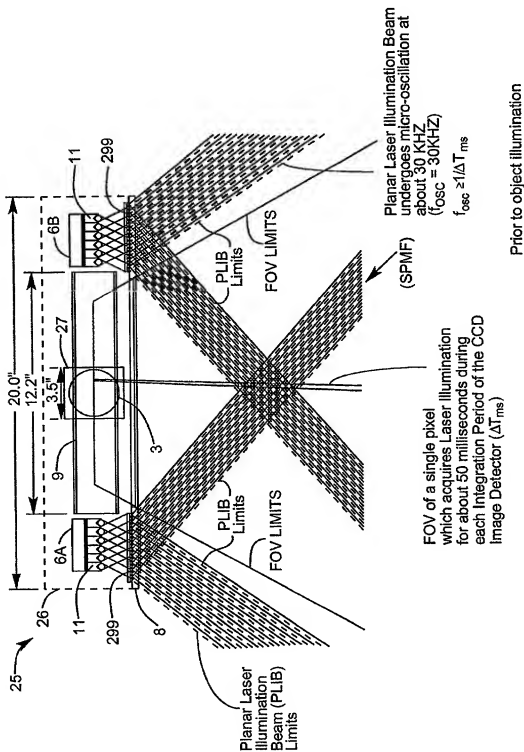


FIG. 112A



THE FIRST GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

Prior to illumination of the target with the planar laser illumination beam (PLIB), modulate the spatial phase of the transmitted PLIB along the planar extent thereof according to a spatial phase modulation function (SPMF) so as to produce numerous substantially different time-varying speckle-noise patterns at the image detection array of the IFD Subsystem during the photo-integration time period thereof.

A

Temporally average the numerous substantially different time-varying speckle-noise patterns produced at the image detection array in the IFD Subsystem during the photo-integration time period thereof, so as to thereby reduce the power of the speckle-noise pattern observed at the image detection array.

B

FIG. 112B

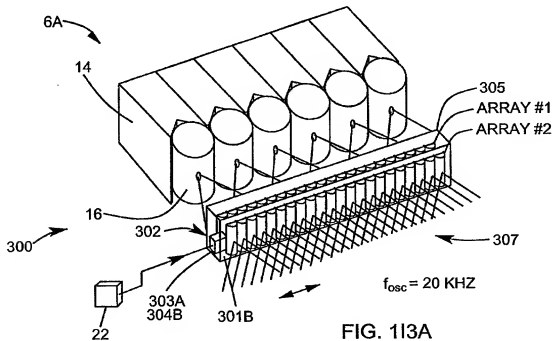


FIG. 113A

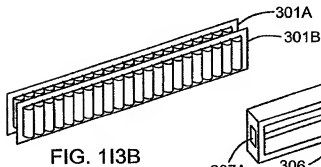


FIG. 113B

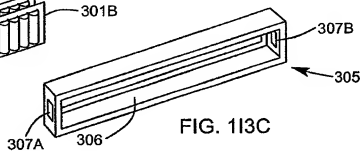


FIG. 113C

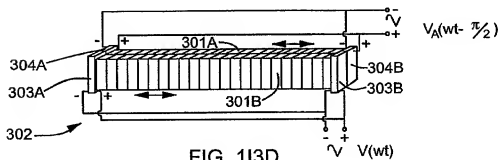
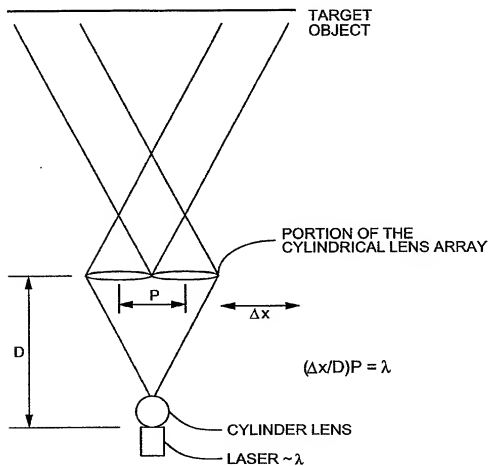


FIG. 113D

10058803-100702



$$\Delta x \geq \frac{\lambda \cdot D}{P}$$

FIG. 113E

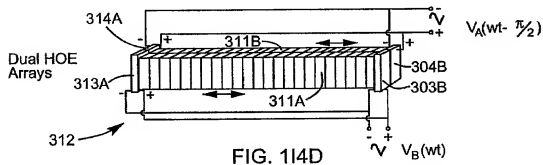
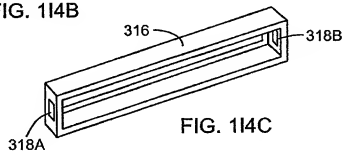
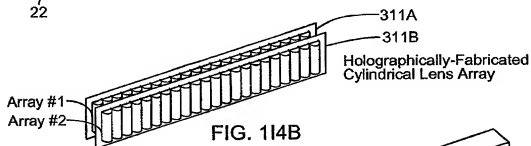
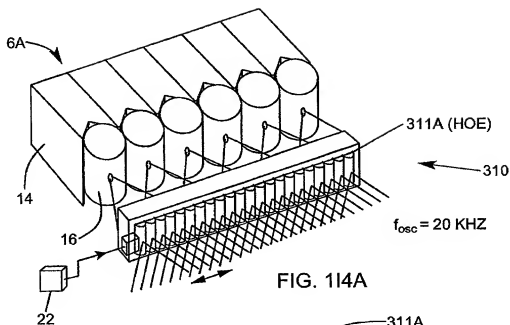


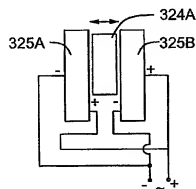
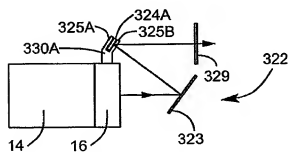
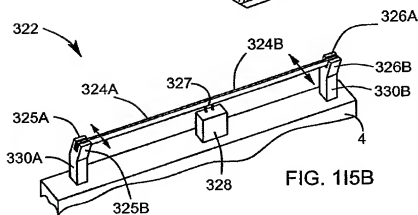
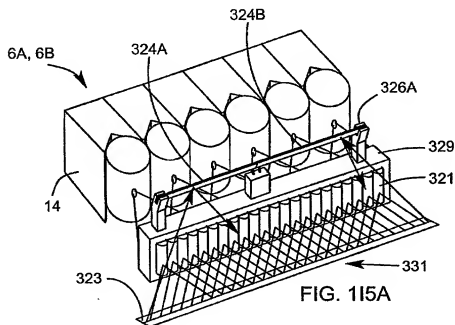
FIG. 113F



FIG. 113G

10058803.100702







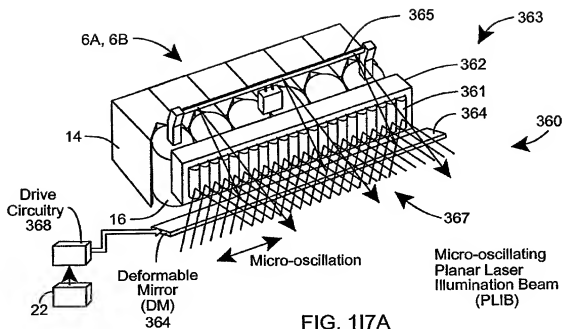


FIG. 117A

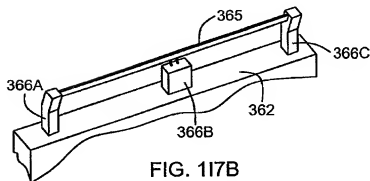


FIG. 117B

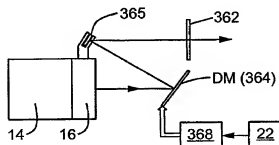
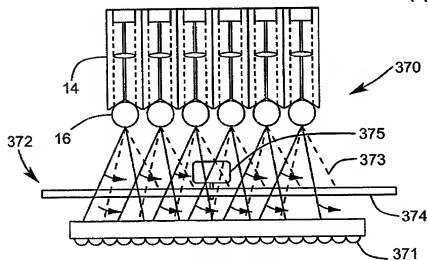
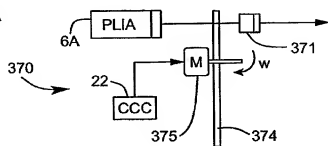
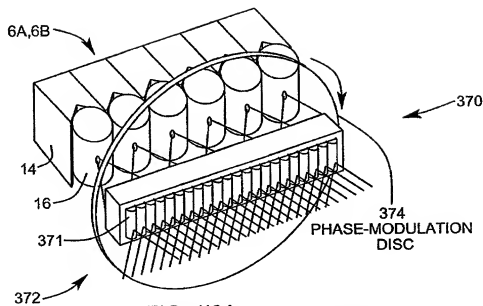


FIG. 117C



202007"E0889001

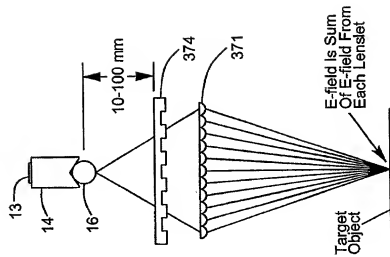


FIG. 18E

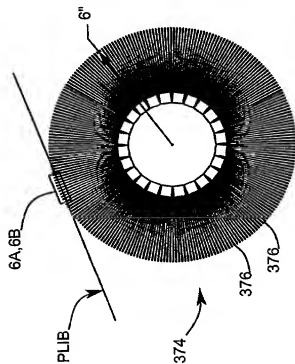


FIG. 18D



FIG. 118G

20/00T" E026900T

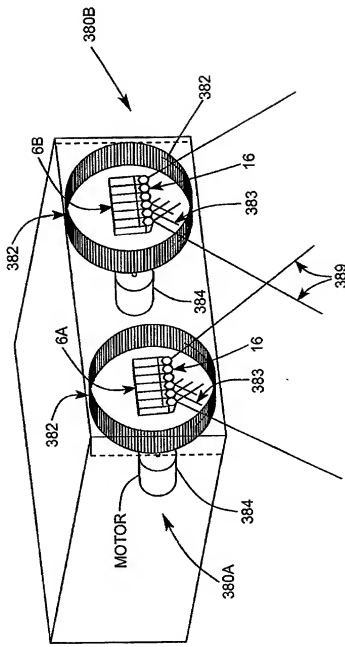


FIG. 119A

202001-0089001

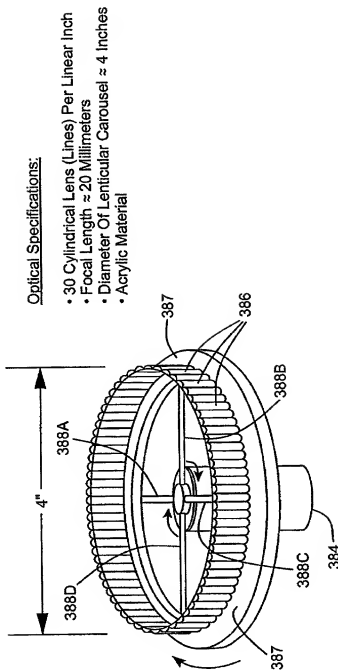


FIG. 119B



202007-008990T

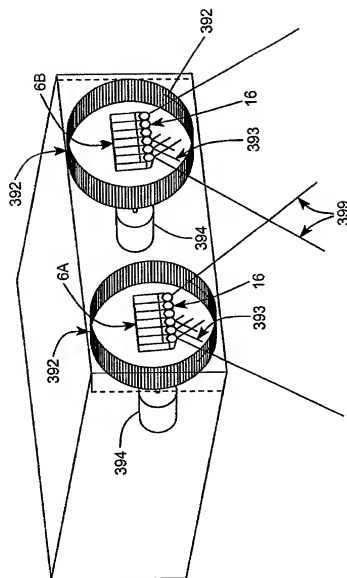
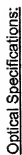
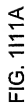


FIG. 1110A



- 30 Cylindrical Lens (Lines) Per Linear Inch
- Focal Length ≈ 20 Millimeters
- Diameter Of Lenticular Carousel ≈ 4 Inches

FIG. 1110B



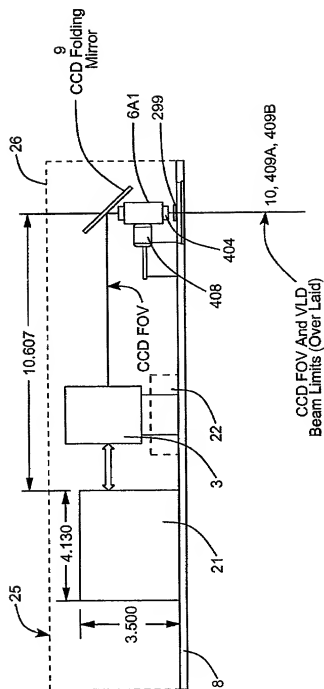


FIG. 111B

202001*E0899001

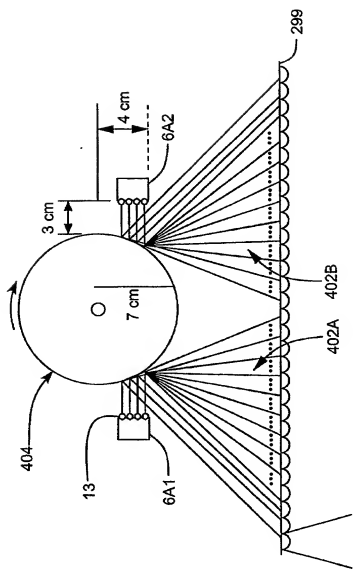
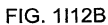
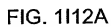


FIG. 111C



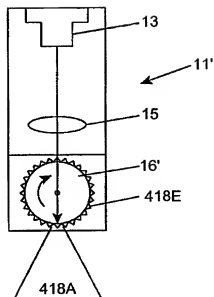


FIG. 1112C

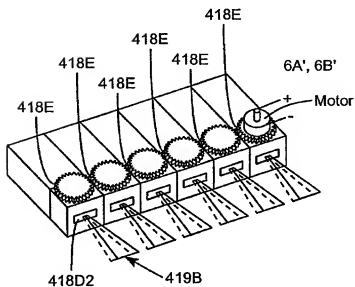
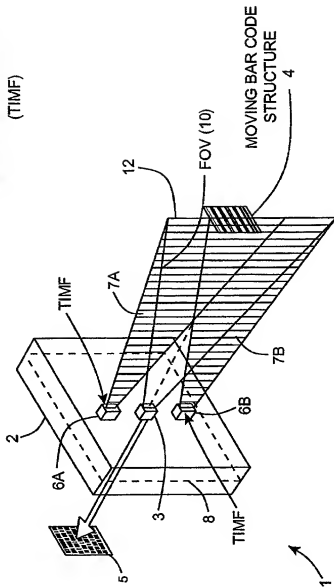


FIG. 1112D

202001*E0899001



Second Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)



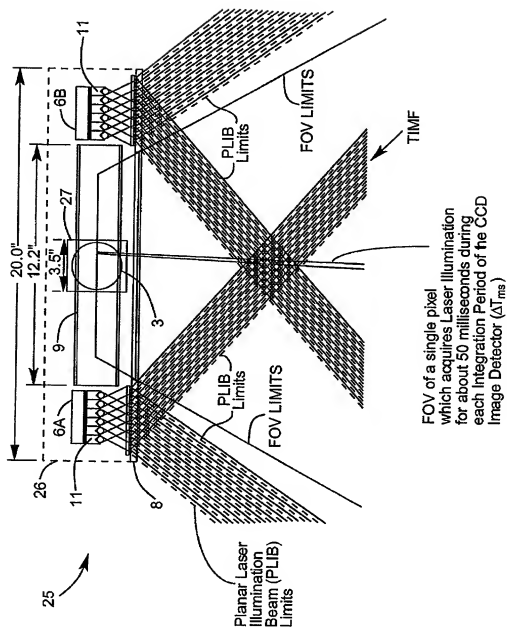


FIG. 1113A

THE SECOND GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

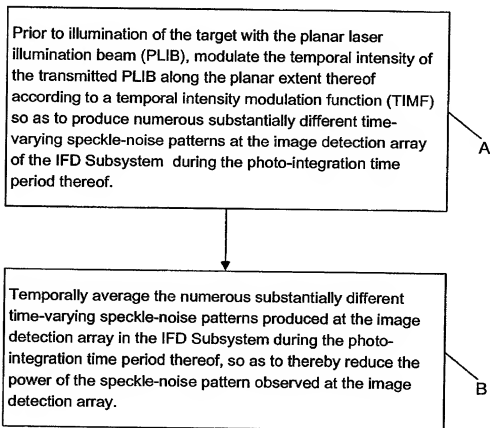


FIG. 1113B

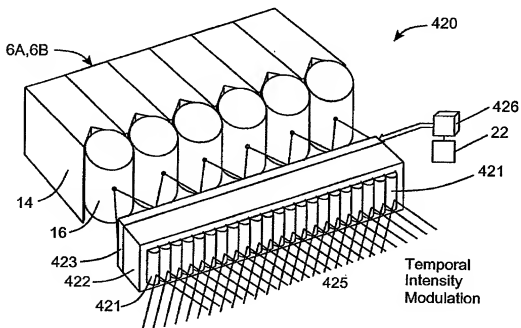


FIG. 1114A

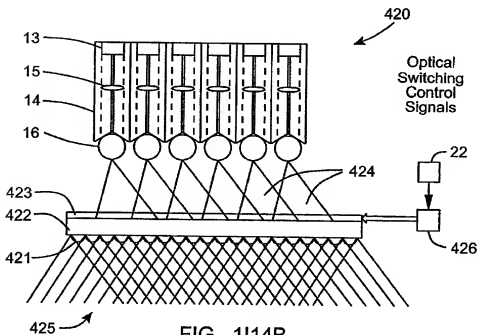


FIG. 1114B

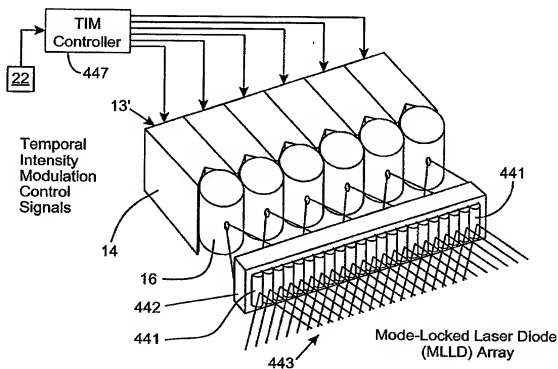


FIG. 1115A

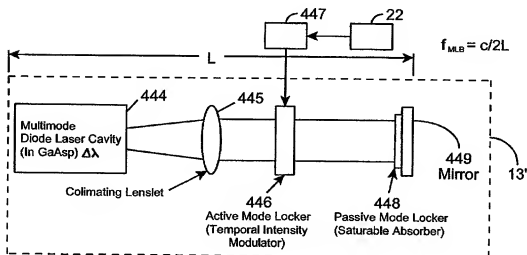


FIG. 1115B

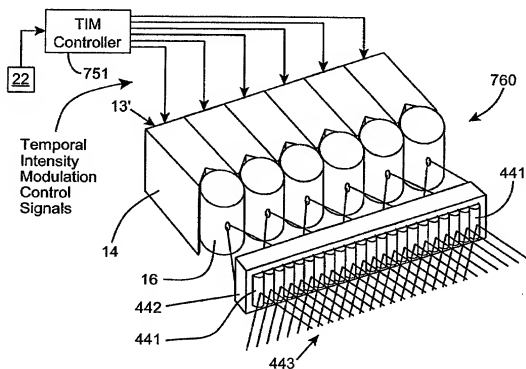


FIG. 1115C

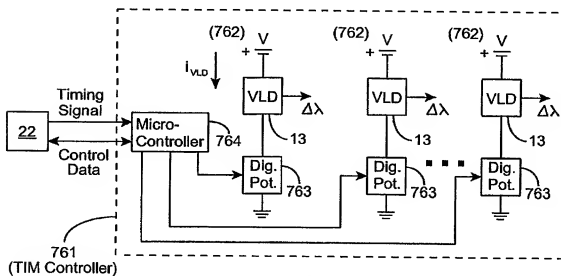


FIG. 1115D

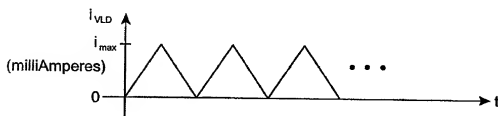


FIG. 1115E

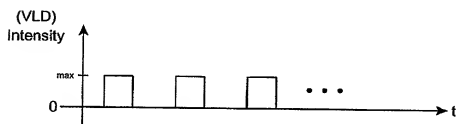


FIG. 1115F

1066883-100702

FOV of a single pixel which acquires Laser Illumination for about 50 milliseconds during each Integration Period of the CCD Image Detector (ΔT_{ms})

FIG. 1116A

THE THIRD GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

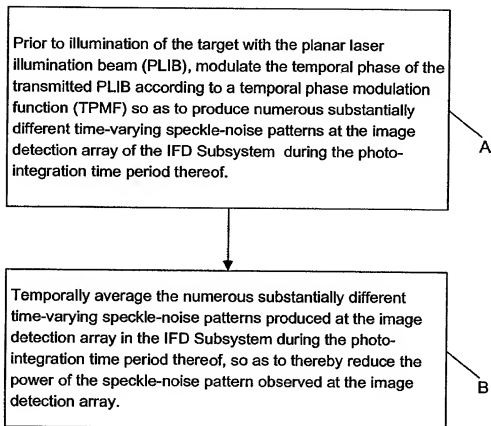
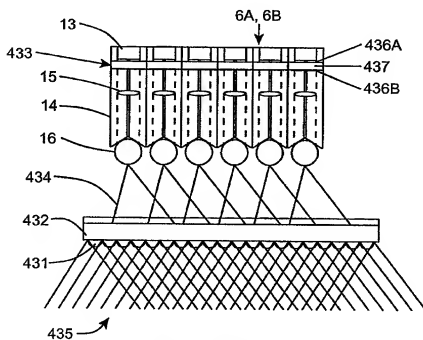
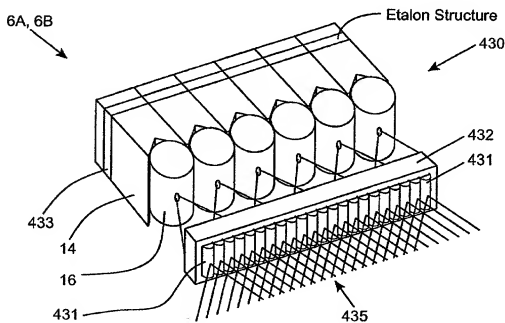


FIG. 1116B



10068803 "100702"

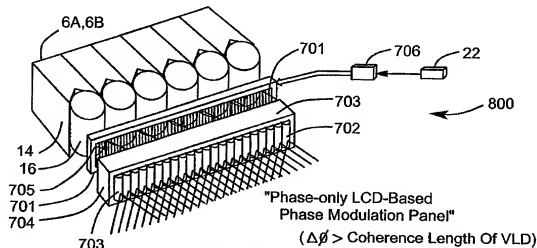


FIG. 1117C

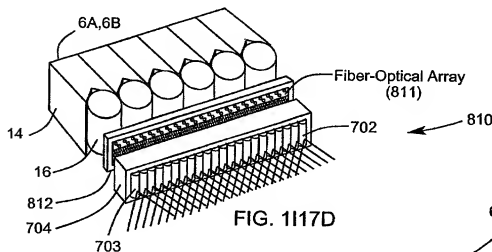


FIG. 1117D

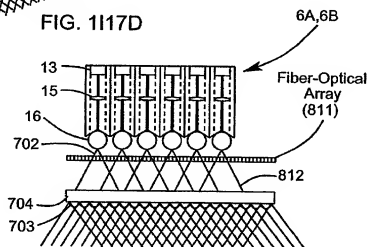


FIG. 1117E

20700T"ED88900T

Fourth Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

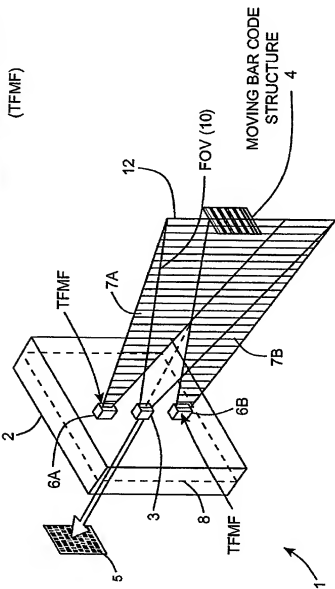


FIG. 1118



202001*E0889001

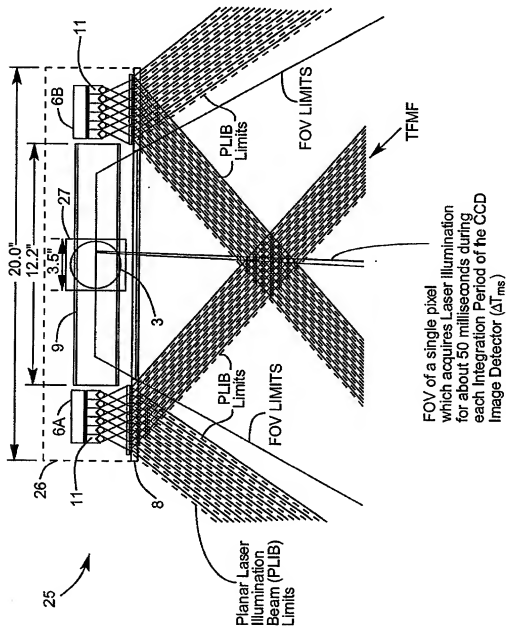


FIG. 1118A

THE FOURTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

Prior to illumination of the target with the planar laser illumination beam (PLIB), modulate the temporal frequency of the transmitted PLIB along the planar extent thereof according to a temporal intensity modulation function (TIMF) so as to produce numerous substantially different time-varying speckle-noise patterns at the image detection array of the IFD Subsystem during the photo-integration time period thereof.

A

Temporally average the numerous substantially different time-varying speckle-noise patterns produced at the image detection array in the IFD Subsystem during the photo-integration time period thereof, so as to thereby reduce the power of the speckle-noise pattern observed at the image detection array.

B

FIG. 1118B

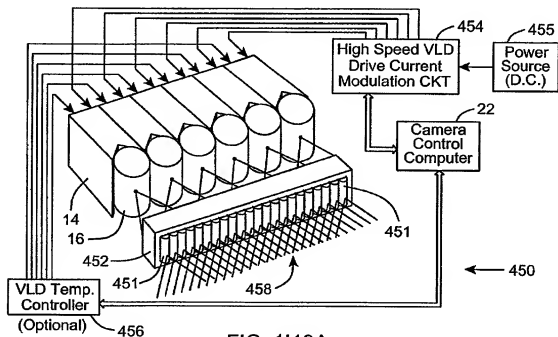


FIG. 1119A

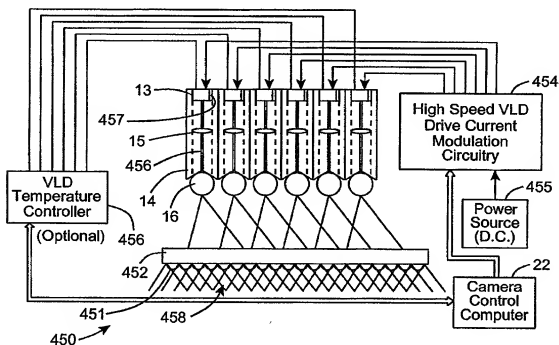


FIG. 1119B

10068803.100702

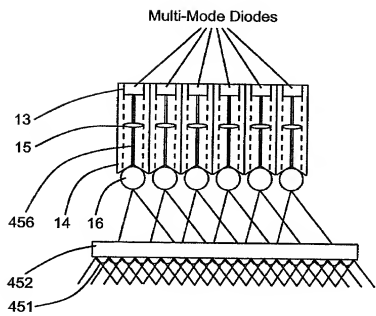


FIG. 1119C

Fifth Generalized Method Of
 Reducing Speckle-Noise Patterns
 At Image Detection Array
 Of The IFD Subsystem (3)

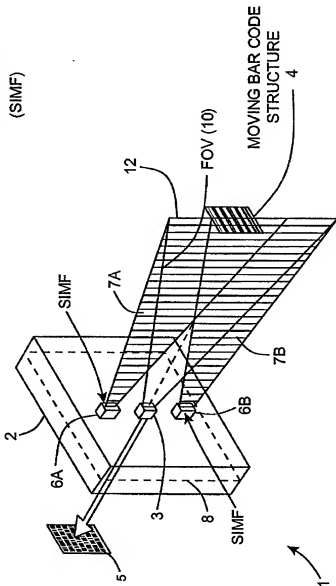


FIG. 1120

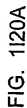


FIG. 1120A

THE FIFTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

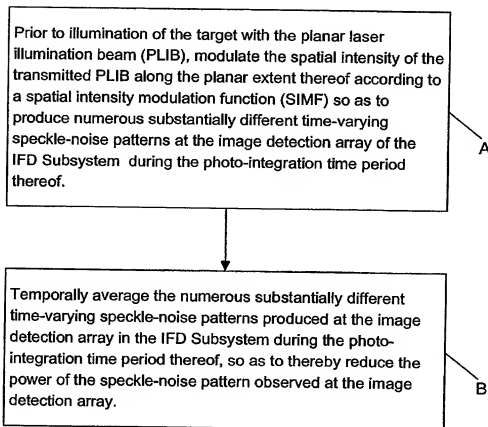
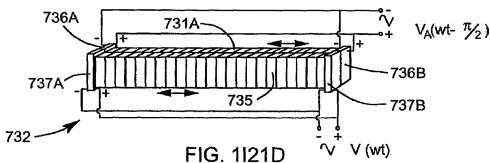
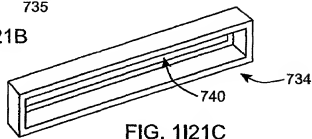
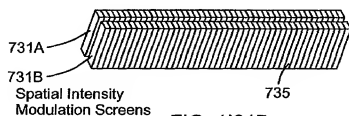
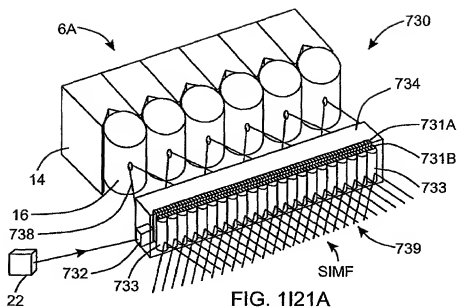


FIG. 1120B



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Sixth Generalized Method Of
 Reducing Speckle-Noise Patterns
 At Image Detection Array
 Of The IFD Subsystem (3)

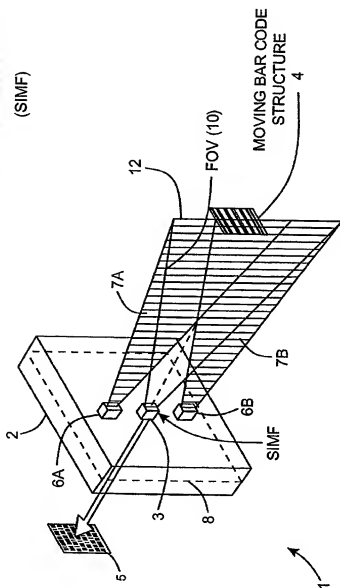


FIG. 1122

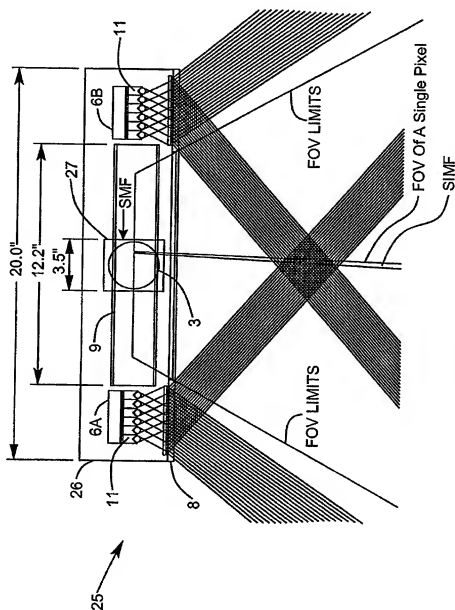


FIG. 1122A

THE SIXTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

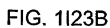
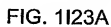
After illumination of the target with the planar laser illumination beam (PLIB), modulate the spatial intensity of the reflected/scattered (i.e. received) PLIB along the planar extent thereof according to a spatial intensity modulation function (SIMF) so as to produce numerous substantially different time-varying speckle-noise patterns at the image detection array of the IFD Subsystem during the photo-integration time period thereof.

A

Temporally average the many substantially different time-varying speckle-noise patterns produced at the image detection array in the IFD Subsystem during the photo-integration time period thereof, so as to thereby reduce the speckle-noise pattern observed at the image detection array.

B

FIG. 1122B



202001*E0829001



Seventh Generalized Method Of
Reducing Speckle-Noise Patterns
At Image Detection Array
Of The IFD Subsystem (3)

(TIMF)

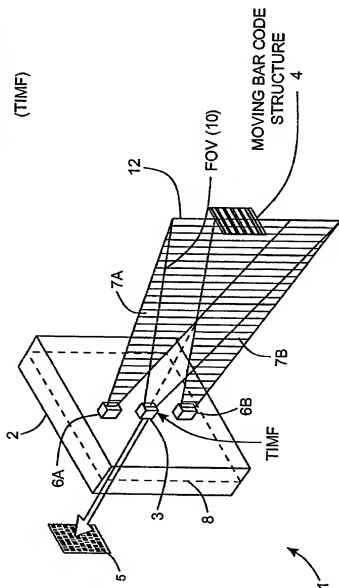
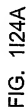


FIG. 1124



THE SEVENTH GENERALIZED SPECKLE-NOISE PATTERN REDUCTION
METHOD OF THE PRESENT INVENTION

After illumination of the target with the planar laser illumination beam (PLIB), modulate the temporal intensity of the reflected/scattered (i.e. received) PLIB along the planar extent thereof according to a temporal intensity modulation function (TIMF) so as to produce many substantially different time-varying speckle-noise patterns at the image detection array of the IFD Subsystem during the photo-integration time period thereof.

A

Temporally average the many substantially different time-varying speckle-noise patterns produced at the image detection array in the IFD Subsystem during the photo-integration time period thereof, so as to thereby reduce the speckle-noise pattern observed at the image detection array.

B

FIG. 1124B

204001*E0899001

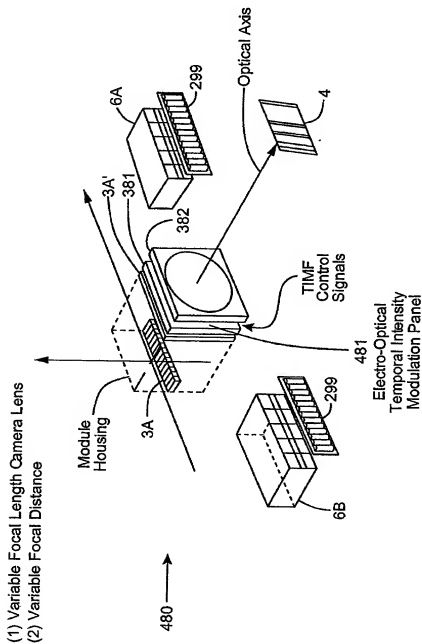
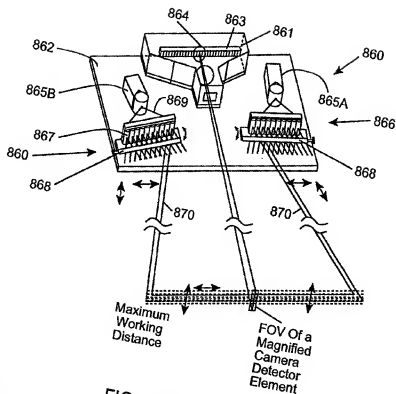
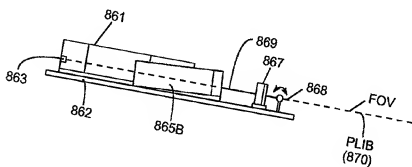


FIG. 1124C



* Lateral And
Transverse
Micro-oscillation
Of PLIB



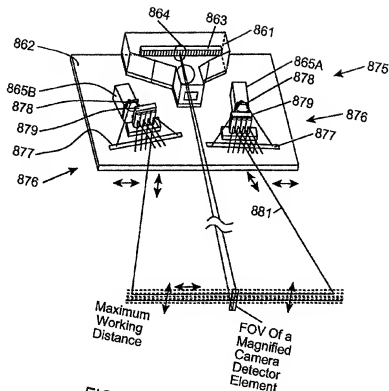


FIG. 1125B1

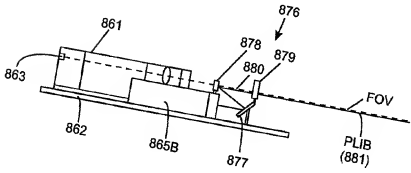


FIG. 1125B2

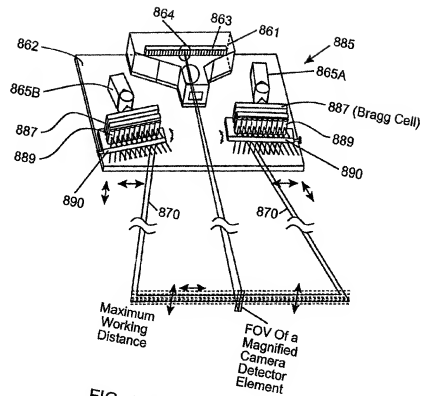


FIG. 1125C1

* Lateral And
 Transverse
 Micro-oscillation
 Of PLIB

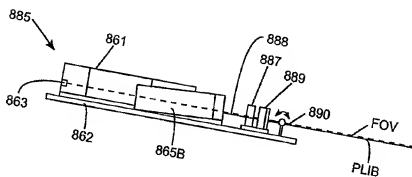
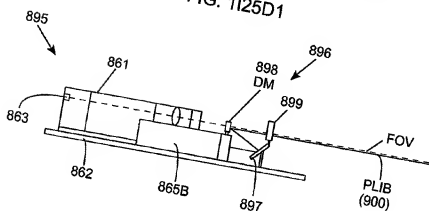
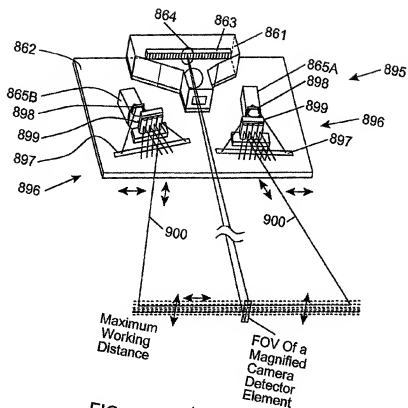


FIG. 1125C2





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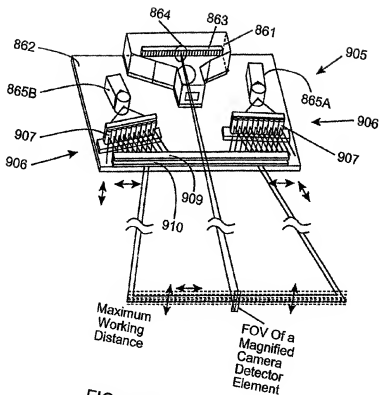


FIG. 1125E1

* Lateral And
Transverse
Micro-oscillation
Of PLIB

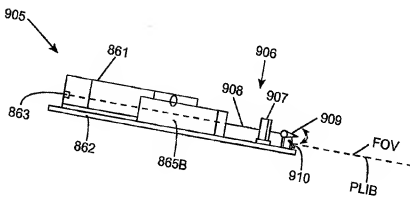
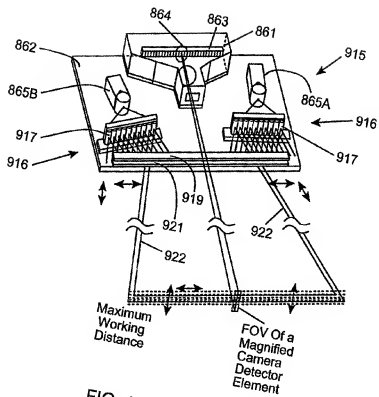
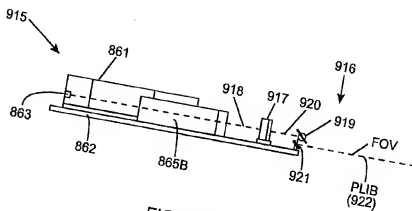
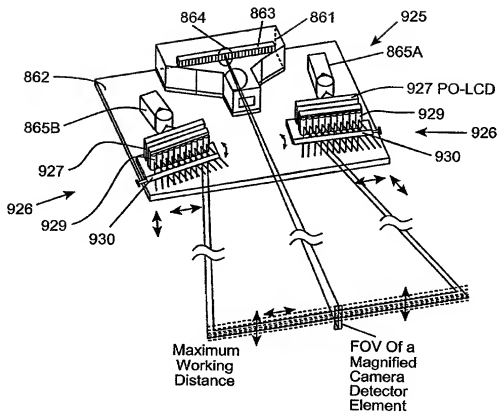


FIG. 1125E2



* Lateral And Transverse Micro-oscillation Of PLIB





* Lateral And
 Transverse
 Micro-oscillation
 Of PLIB

FIG. 1I25G1

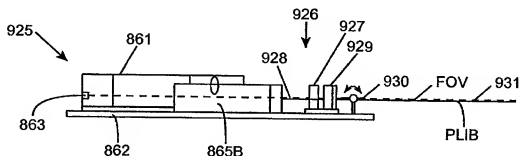


FIG. 1I25G2

202007140294007

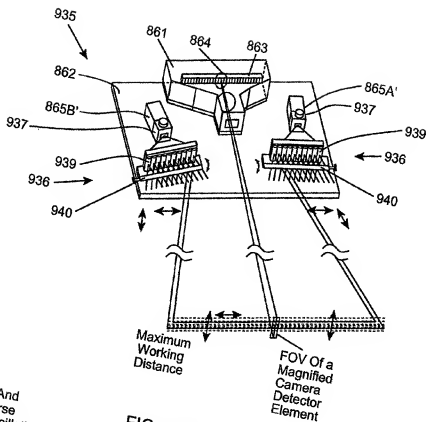


FIG. 1125H1

* Lateral And Transverse Micro-oscillation Of PLIB

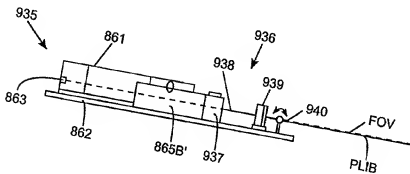


FIG. 1125H2



202007-0085001

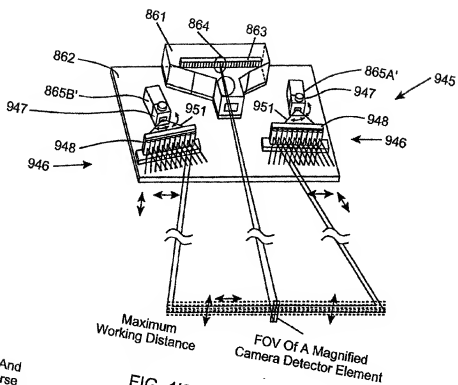


FIG. 112511

* Lateral And Transverse Micro-oscillation Of PLIB

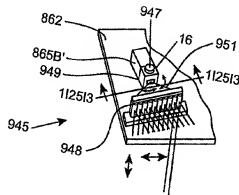


FIG. 112512

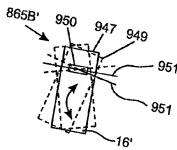


FIG. 112513

10065803-100762

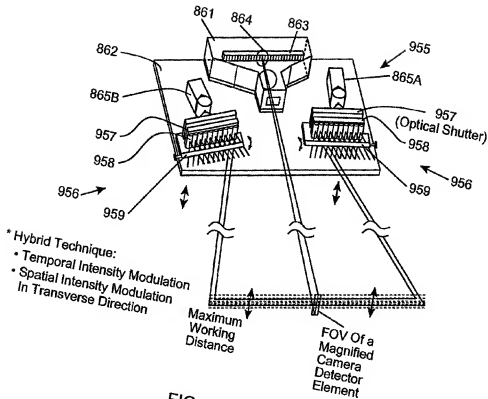


FIG. 1125J1

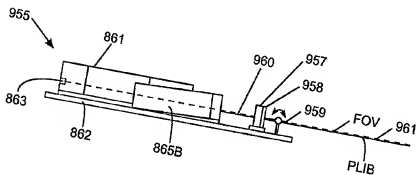


FIG. 1125J2



1106803-100702

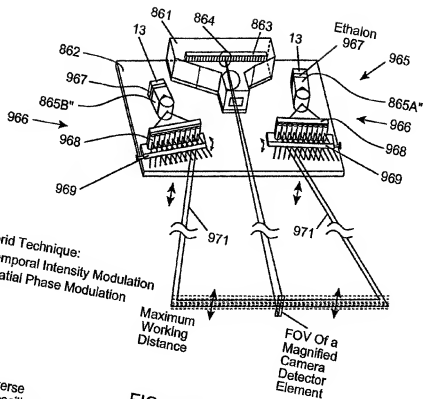


FIG. 1125K1

* Transverse Micro-oscillation Of PLIB

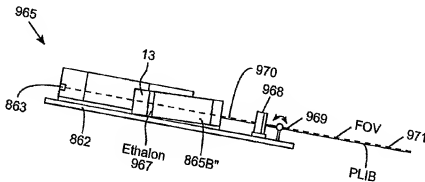
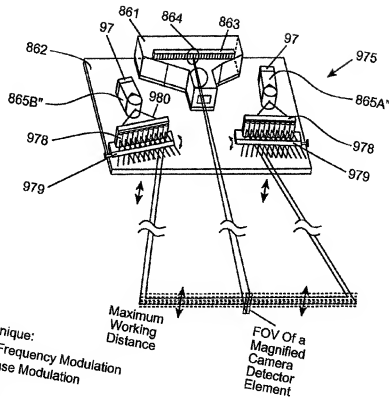


FIG. 1125K2



1005623-100702



- * Hybrid Technique:
 - Temporal Frequency Modulation
 - Spatial Phase Modulation

* Transverse Micro-oscillation Of PLIB

FIG. 1125L1

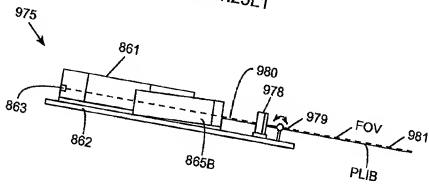


FIG. 1125L2



202704-000000

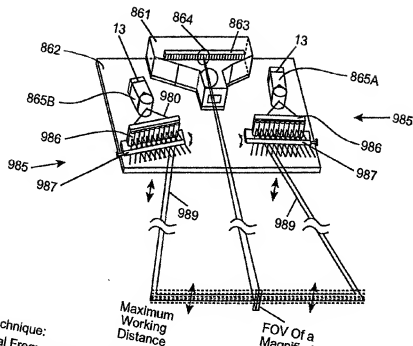


FIG. 1I25M1

- * Hybrid Technique:
 - Temporal Frequency Modulation
 - Spatial Phase Modulation

- * Transverse Micro-oscillation Of PLIB

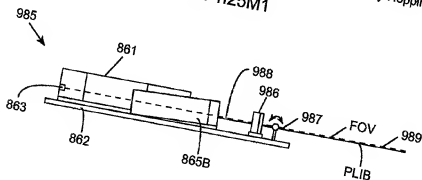


FIG. 1I25M2

1163603-100702

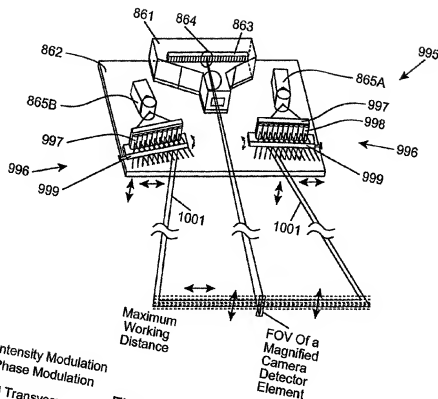


FIG. 1125N1

- * Hybrid;
- * Spatial Intensity Modulation
- * Spatial Phase Modulation
- * Lateral And Transverse Micro-oscillation Of PLIB

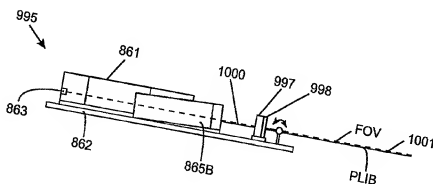


FIG. 1125N2

Fixed Focal Length
Lens Cases

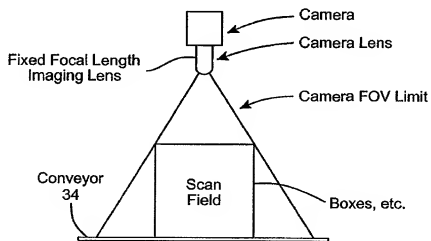


FIG. 1K1

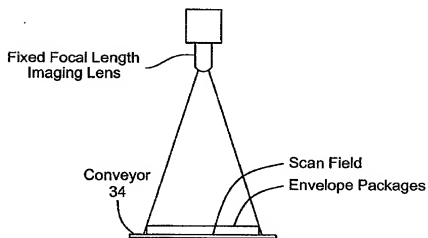


FIG. 1K2

207007-6089001

10068803-100702

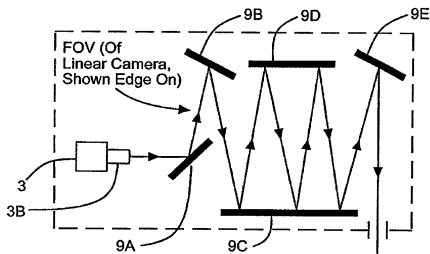


FIG. 1L1

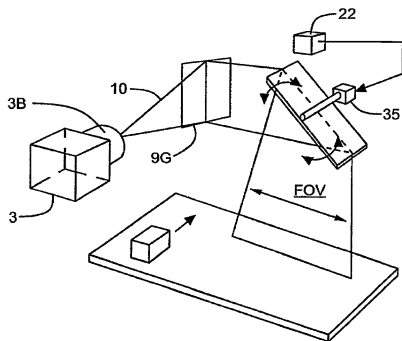


FIG. 1L2



Pixel Power Density vs. Object Distance (General Example)

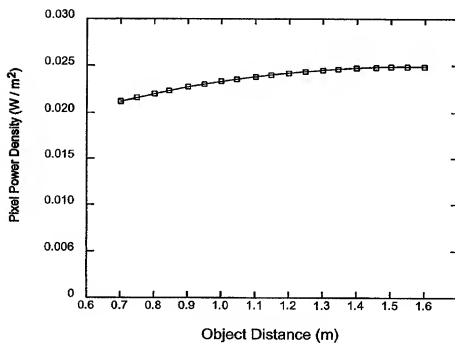


FIG. 1M1



10068803-100702

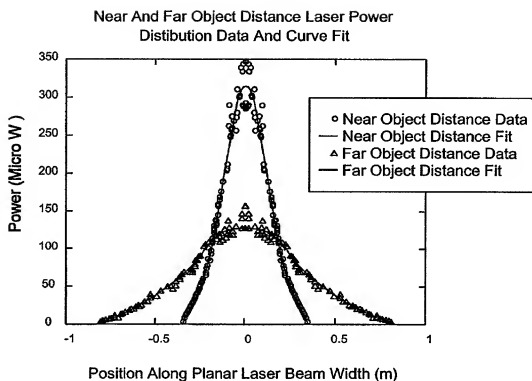


FIG. 1M2



Planar Laser Beam Width vs. Object Distance

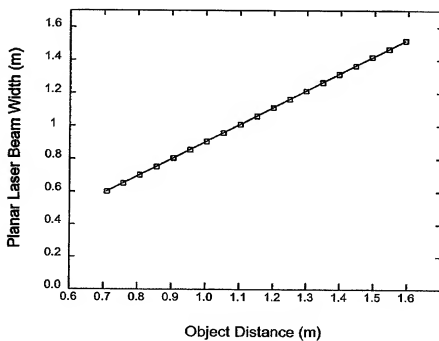


FIG. 1M3



Planar Laser Beam Height vs.
Object Distance (Far Object Distance Focus)

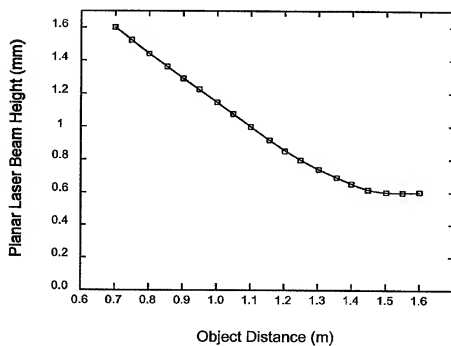


FIG. 1M4



Center Line Power Density vs. Object
Distance (Far Object Distance Focus)

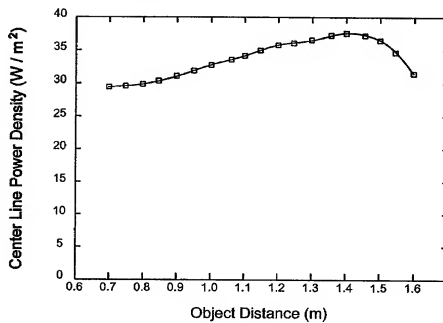


FIG. 1N

Pixel Power Densities vs. Object Distance

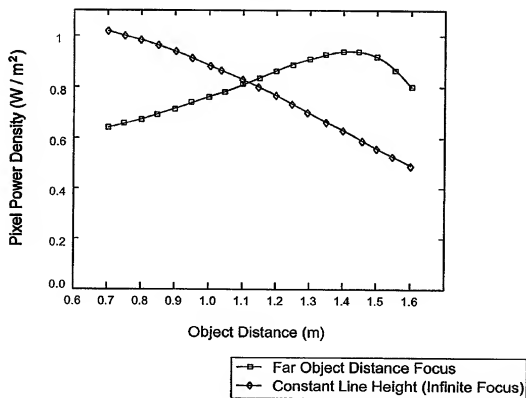
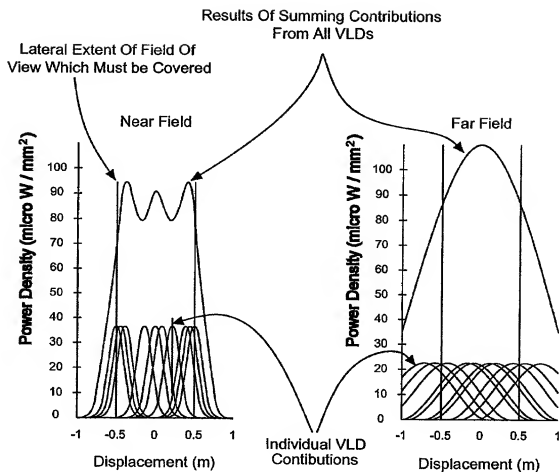


FIG. 10



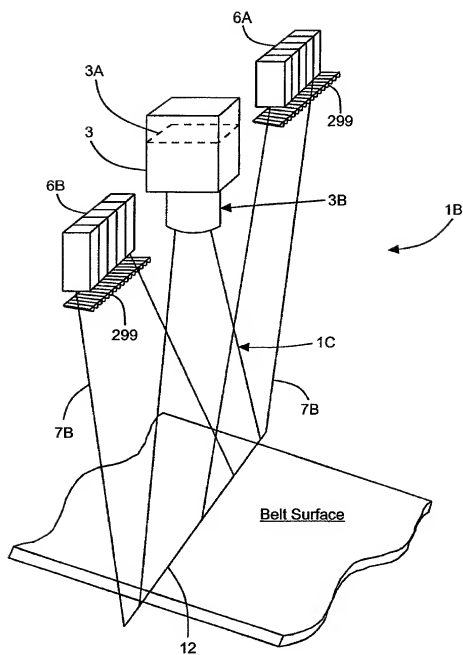


FIG. 1Q1

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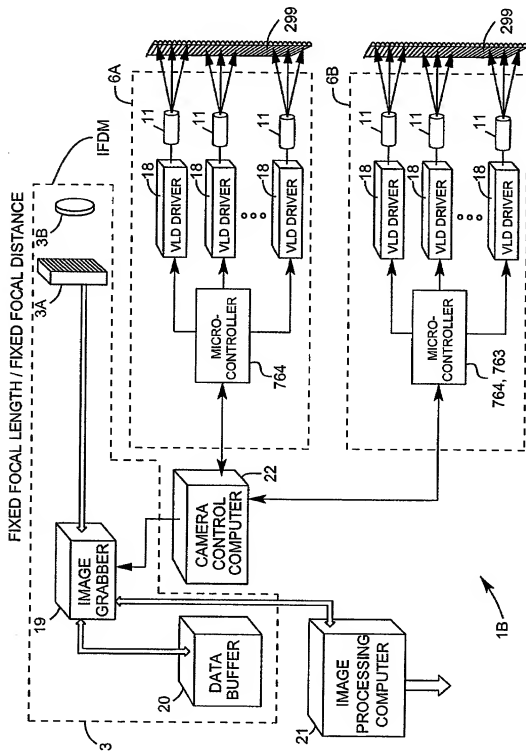


FIG. 1Q2

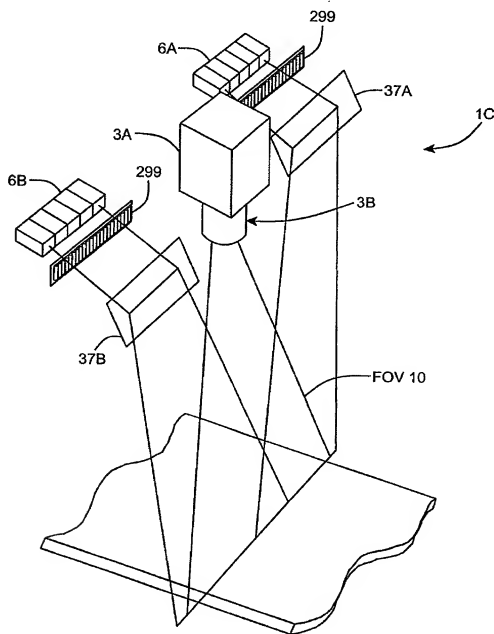


FIG. 1R1

10068303-100702

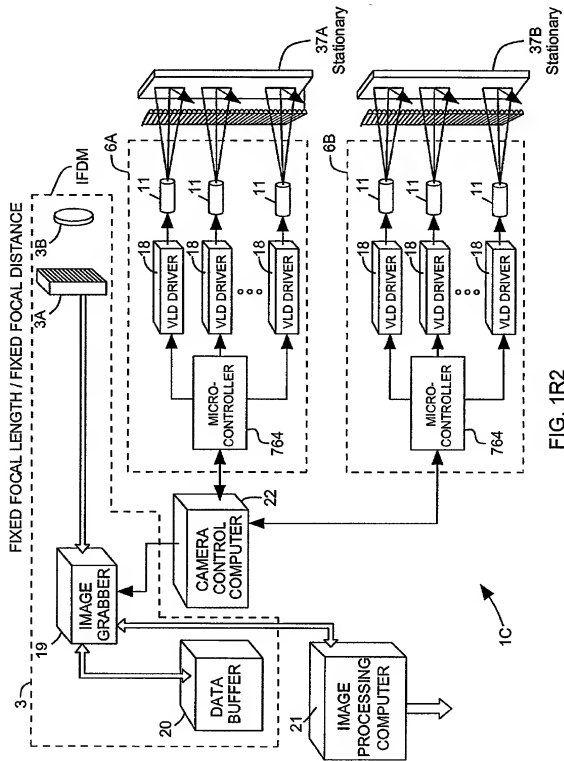


FIG. 1R2

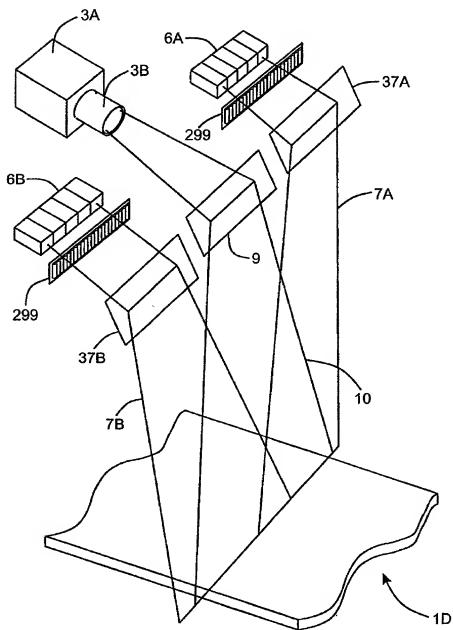


FIG. 1S1

10058603.100702

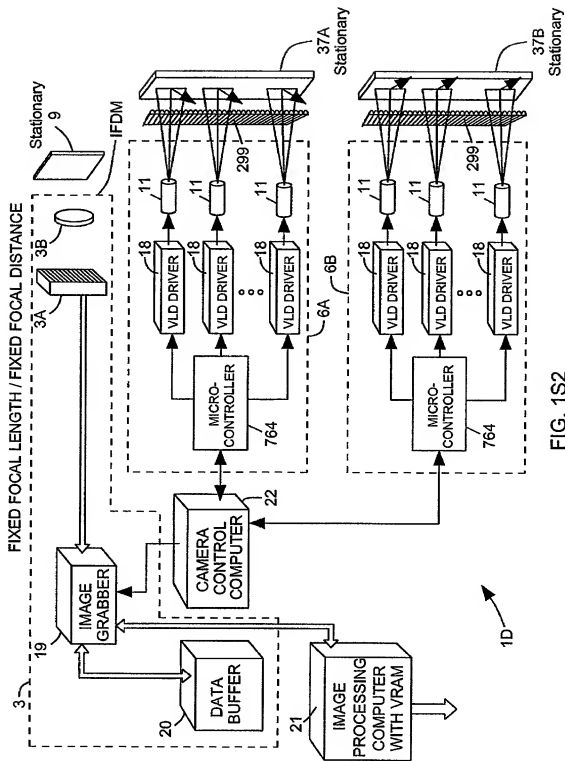


FIG. 1S2



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200702.0088001

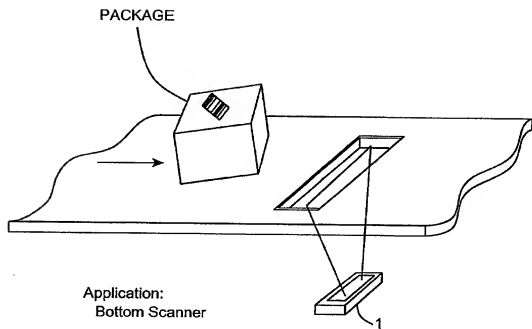


FIG. 1T

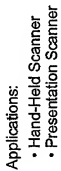


FIG. 1U

2024001*E0889001

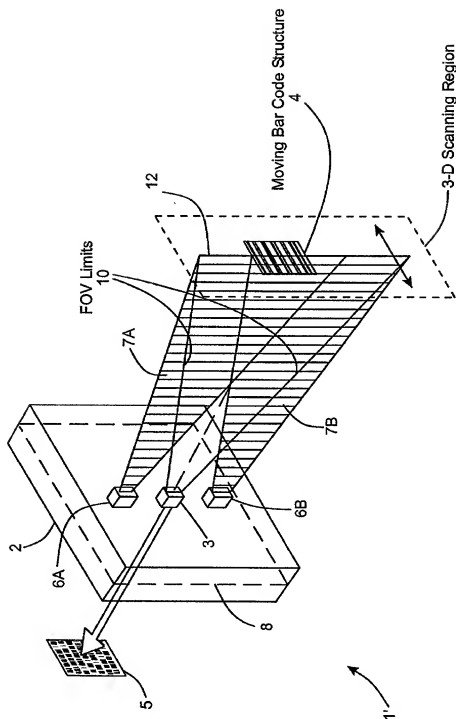


FIG. 1V1

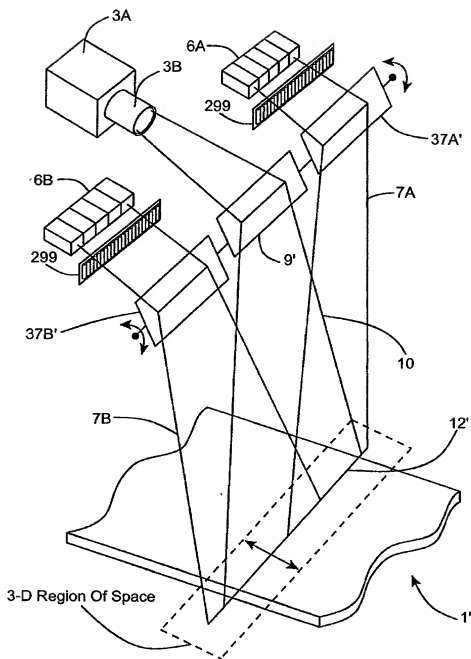


FIG. 1V2

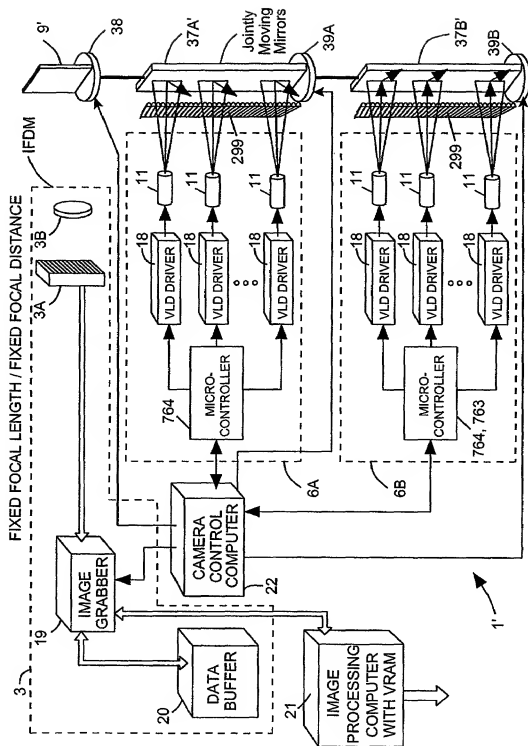


FIG. 1V3



20068807-100700

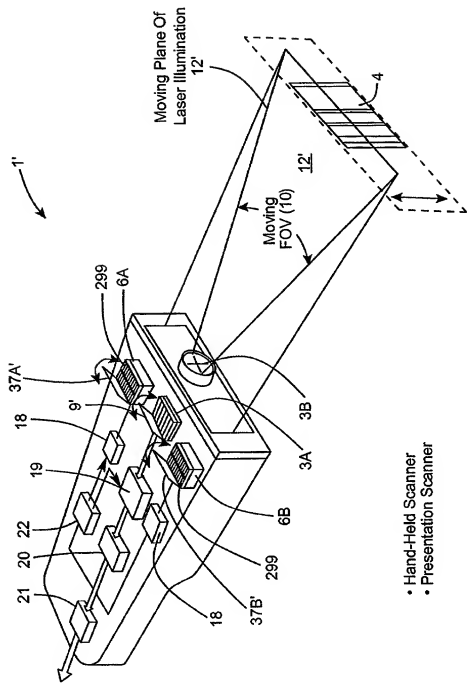


FIG. 1V4

- Hand-Held Scanner
- Presentation Scanner



FIG. 2A

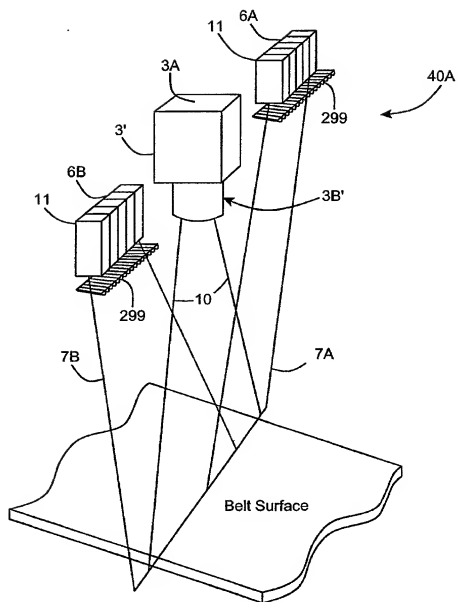


FIG. 2B1

10068803.100702

202001*0089001

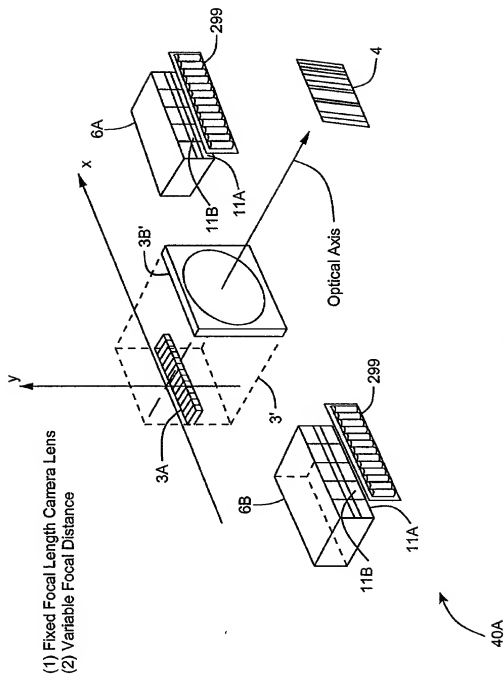


FIG. 2B2

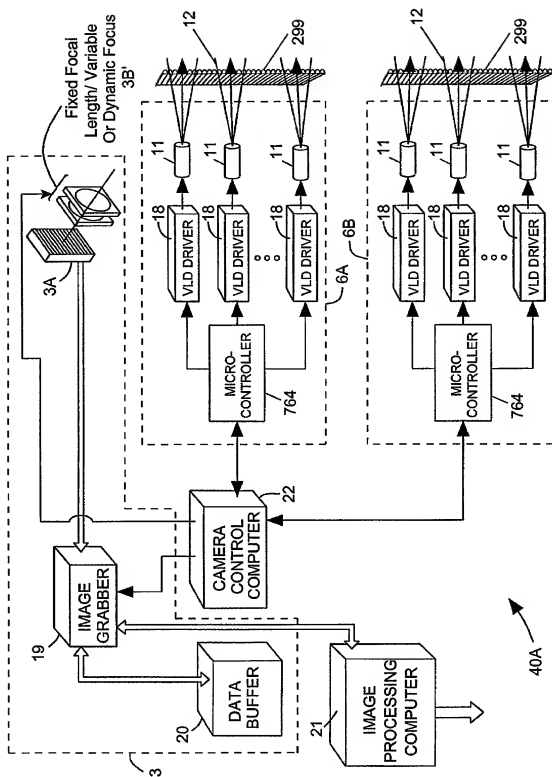
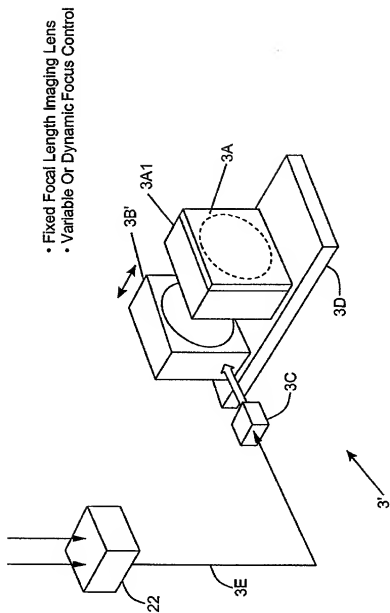


FIG. 2C1

202001*6089001



- Fixed Focal Length Imaging Lens
- Variable Or Dynamic Focus Control

FIG. 2C2

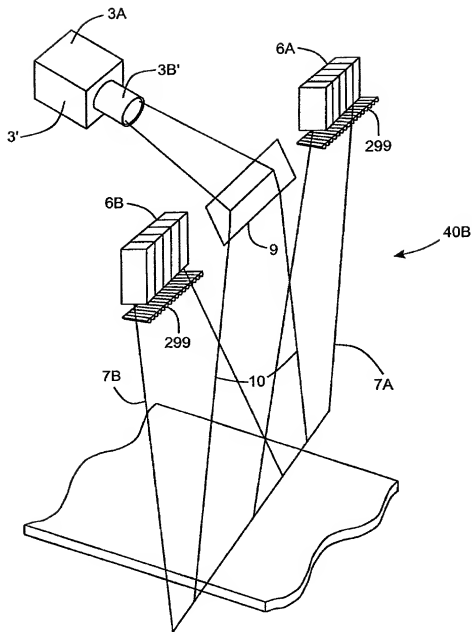


FIG. 2D1

10068803-100702

2007001" E0889001

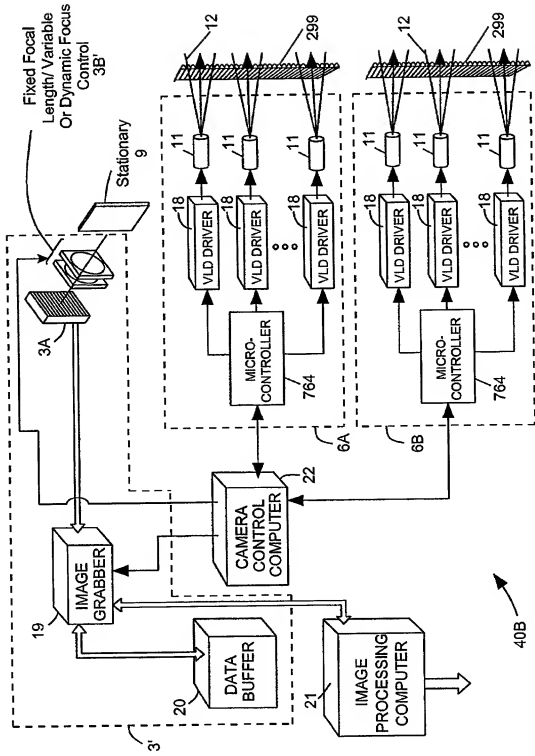


FIG. 2D2

40B

202001*ED89001

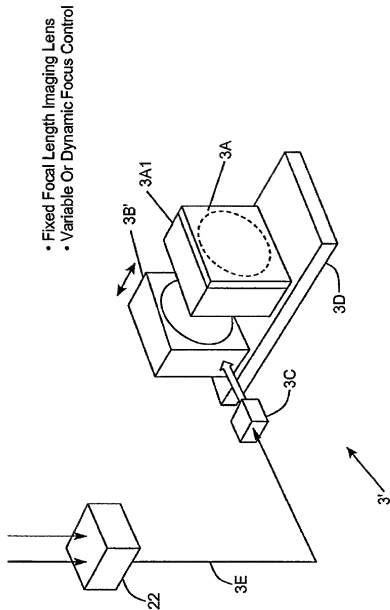


FIG. 2D3

10068803.100702

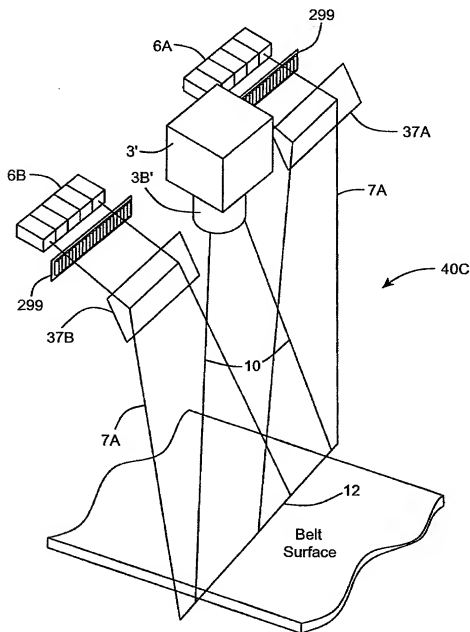


FIG. 2E1

202001" E088900T

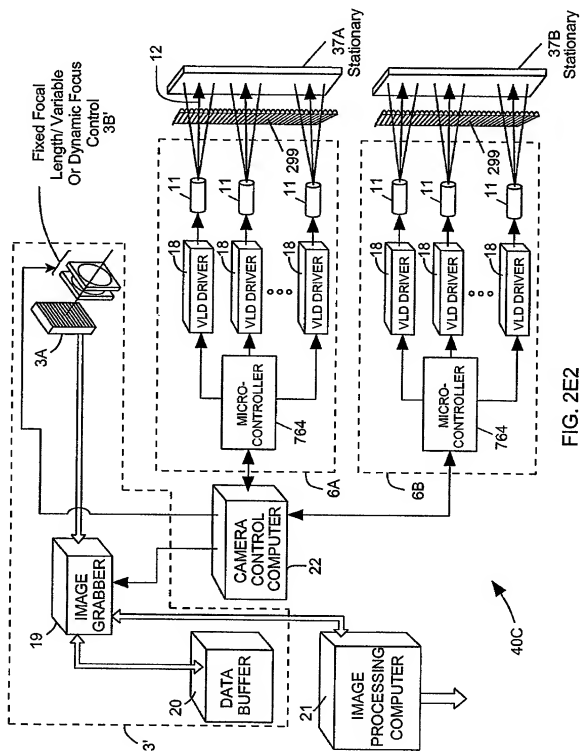


FIG. 2E2

20400T*E089900T

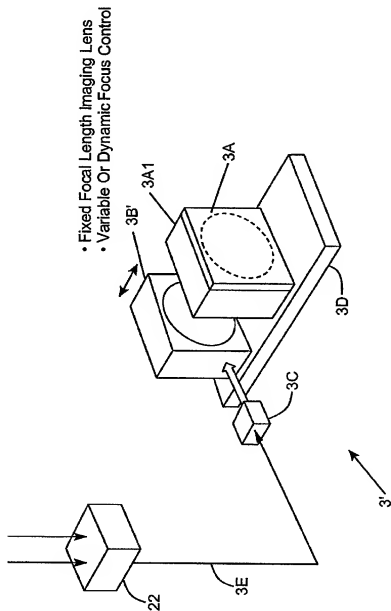


FIG. 2E3

10068803.100702

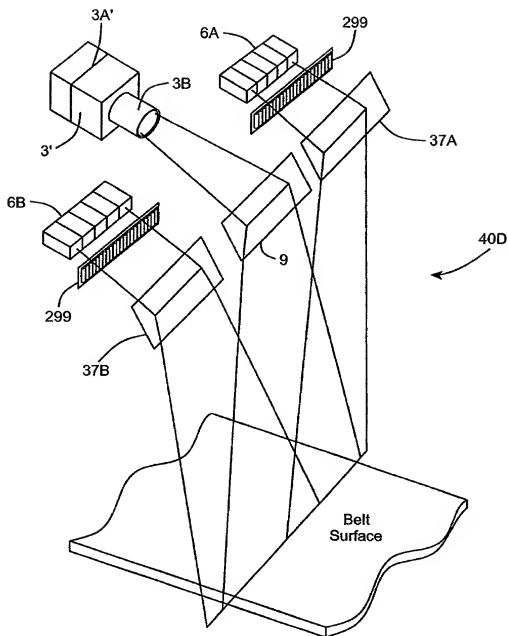


FIG. 2F1

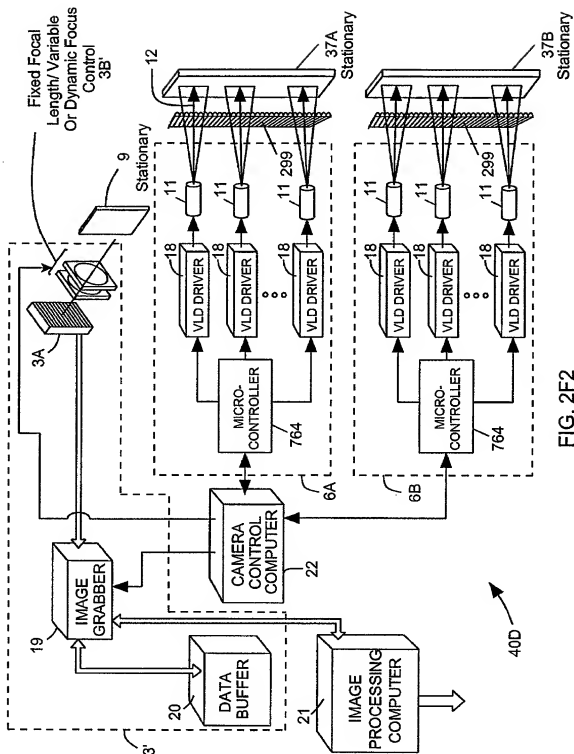


FIG. 2F2

2002001-0089001

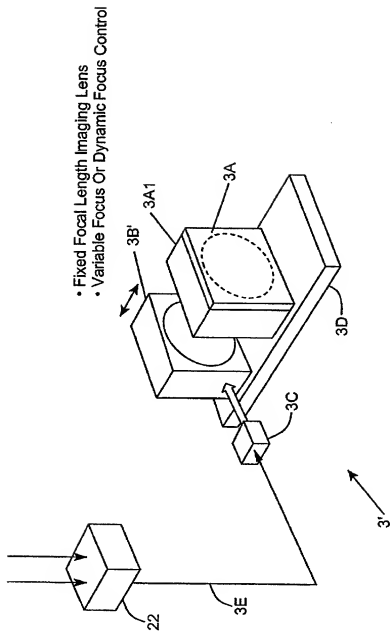


FIG. 2F3



Top Conveyor Scanner:

- Fixed Focal Length Imaging Lens
- Variable Focal Distance Control

Side Conveyor Scanner:

- Fixed Focal Length Imaging Lens
- Dynamic Focal Distance Control

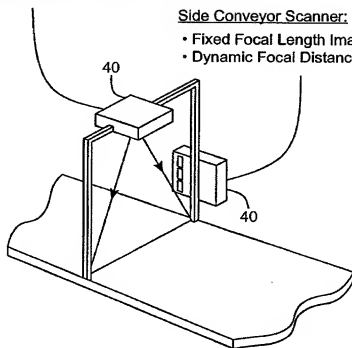


FIG. 2G

1066883-10702



Applications:

- Hand-Held Scanner
- Presentation Scanner

202001" 6089001

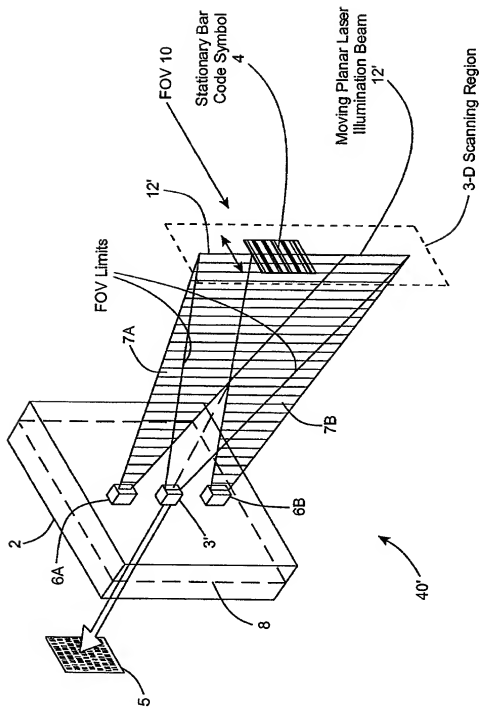


FIG. 211

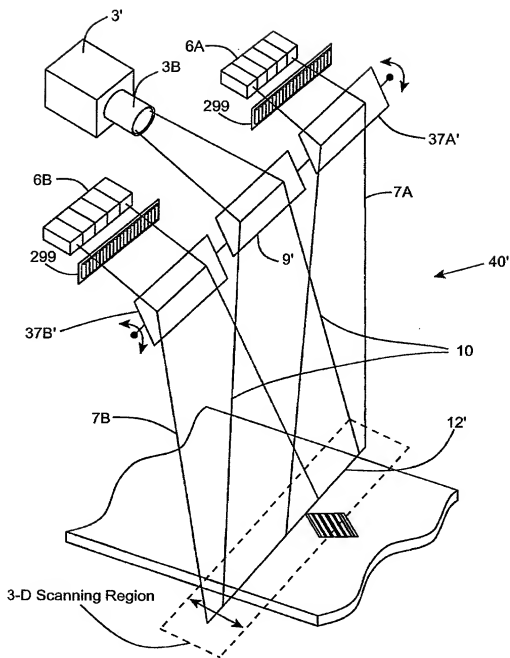


FIG. 212

204001" E0889001

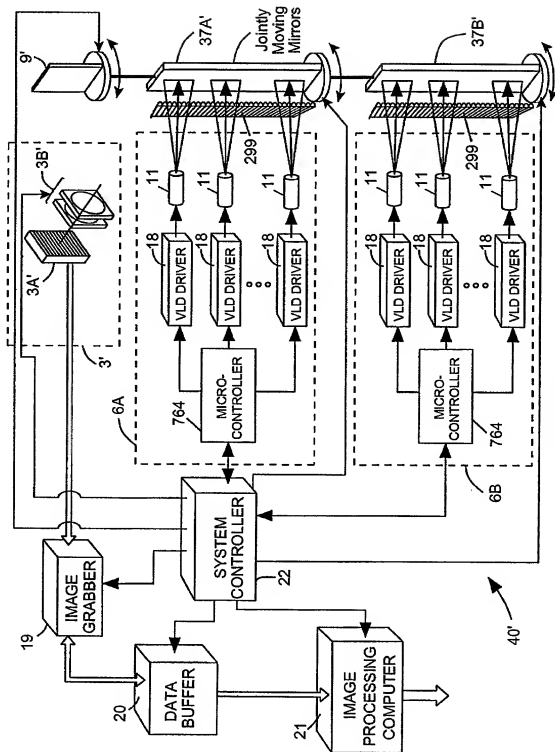


FIG. 213



202001-0089001

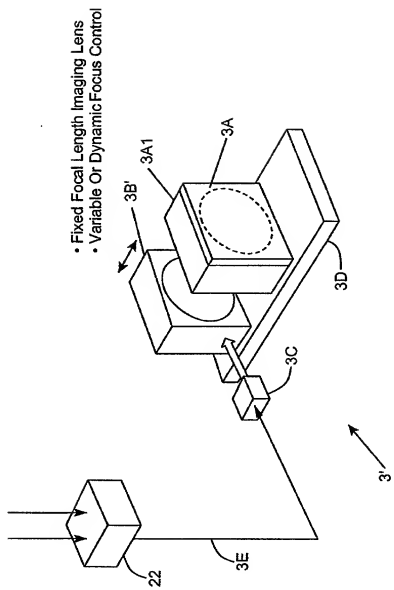


FIG. 21A

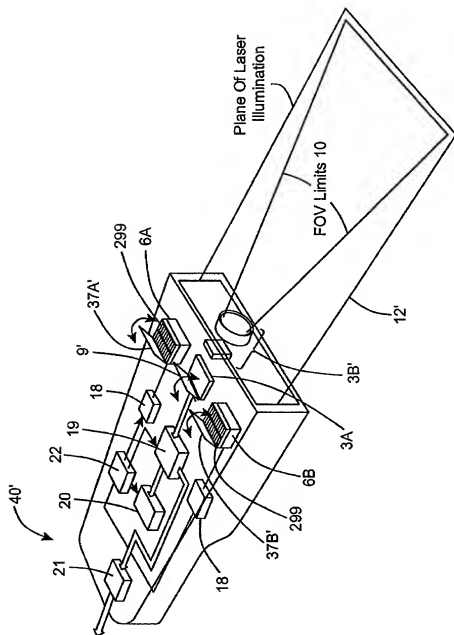


FIG. 215

1068803-100702

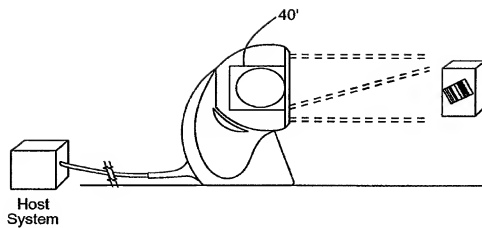


FIG. 216

10068303 700703

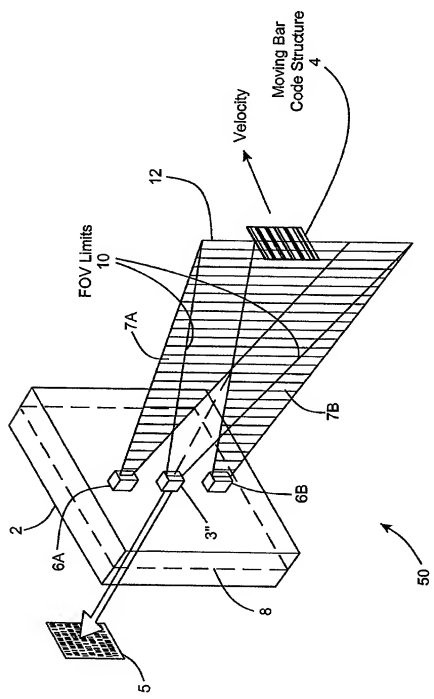


FIG. 3A



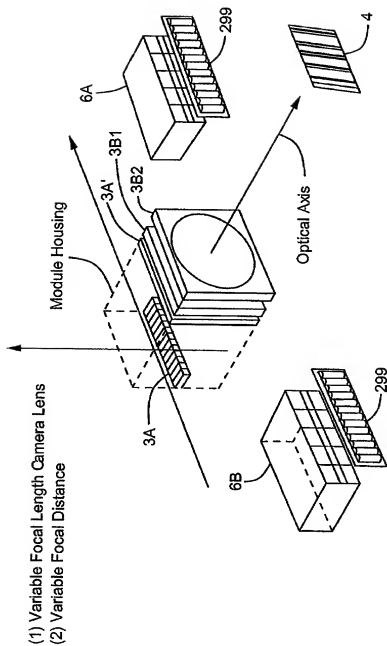


FIG. 3B2

20/00T*E088900T

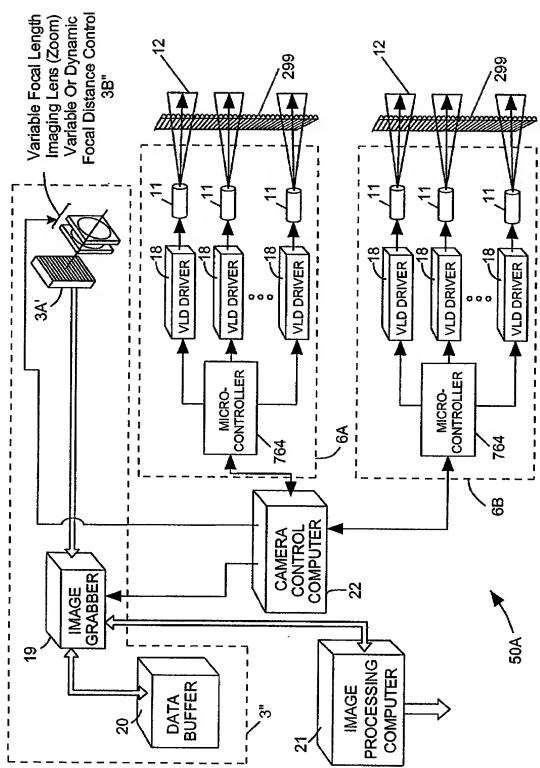
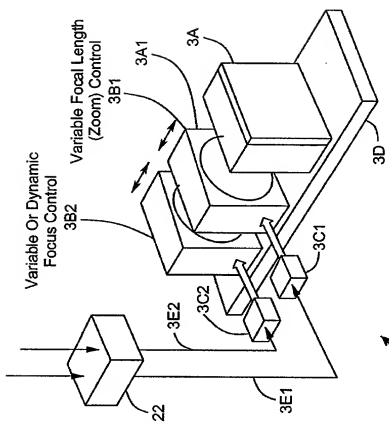


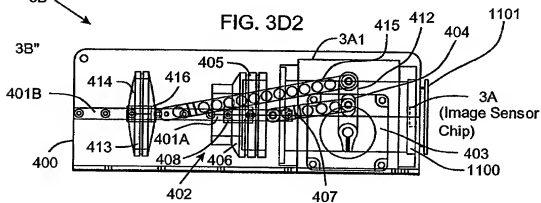
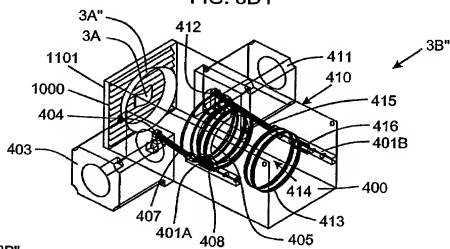
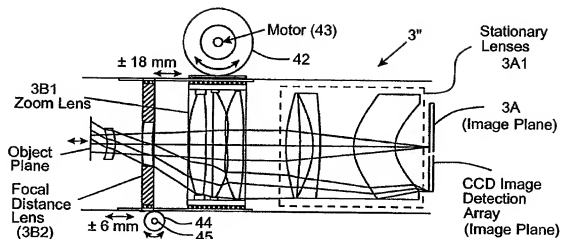
FIG. 3C1

202007"08899001



- Variable Focal Length Camera Lens
- Variable Focal Distance

FIG. 3C2



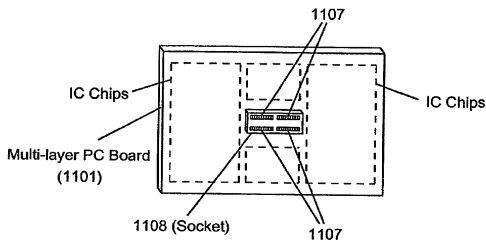


FIG. 3D6

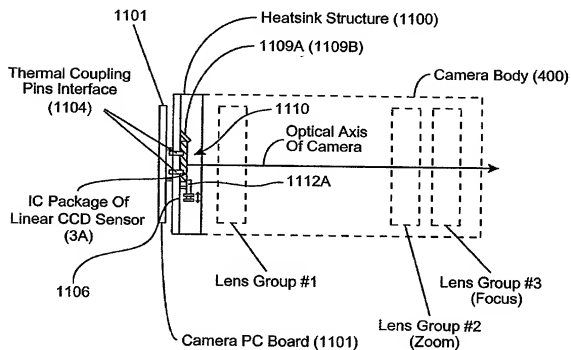


FIG. 3D7

10068803-100702

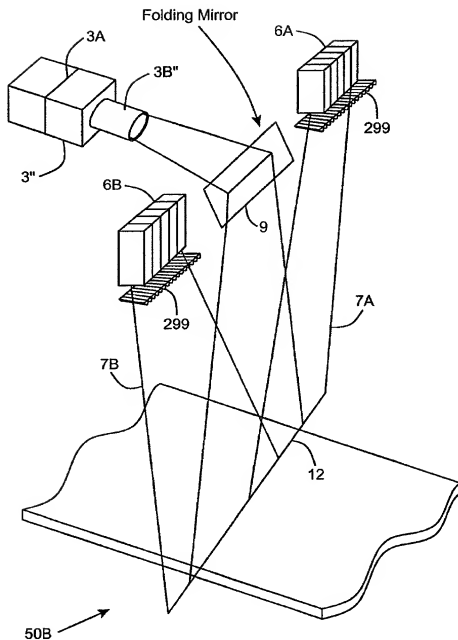


FIG. 3E1

10068803-100702



FIG. 3E2

202007*E088900T

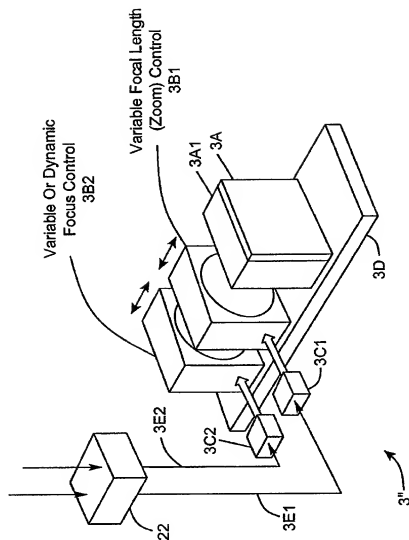


FIG. 3E3

10058803.100702

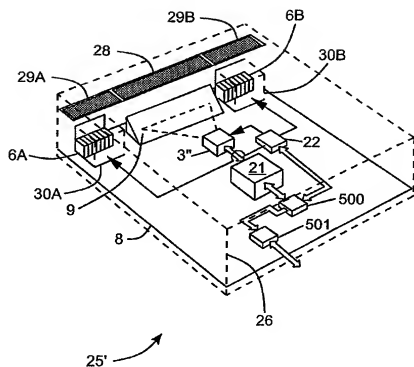


FIG. 3E4

10068803.100702

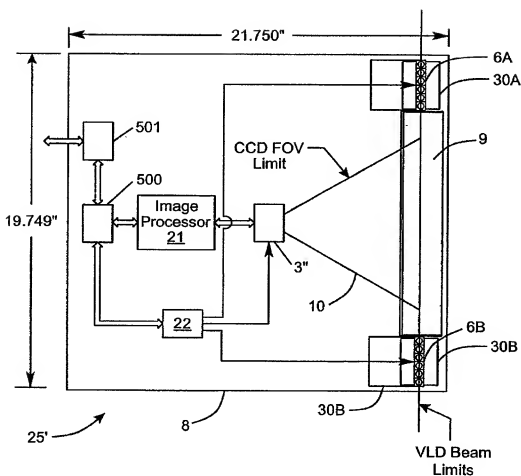


FIG. 3E5

202001-0089001

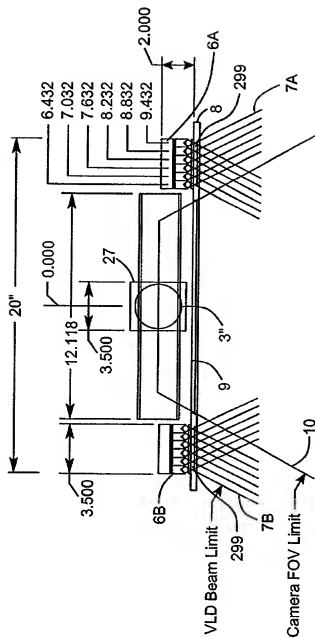


FIG. 3E6

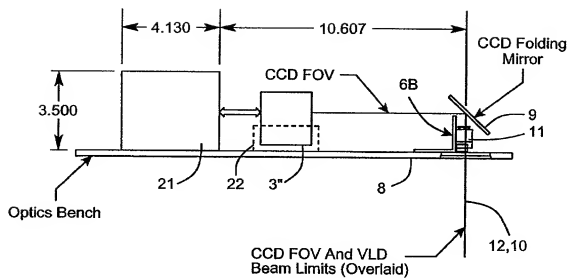


FIG. 3E7



* Variable FOV

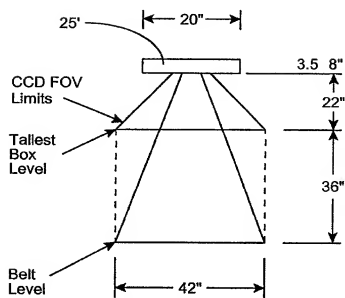


FIG. 3E8

10058803.100702

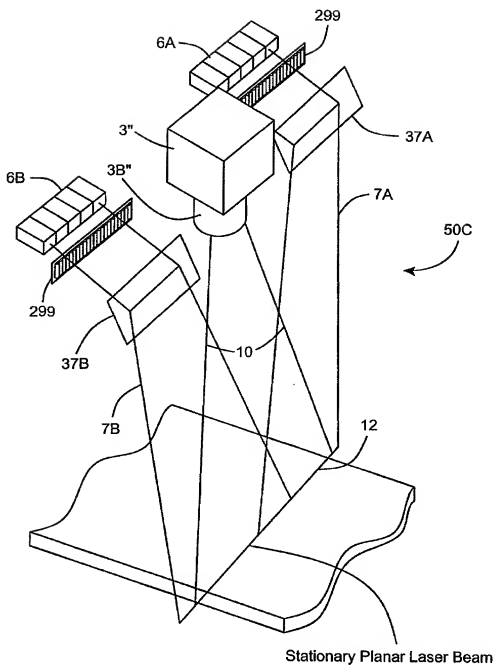


FIG. 3F1

10068803-100702

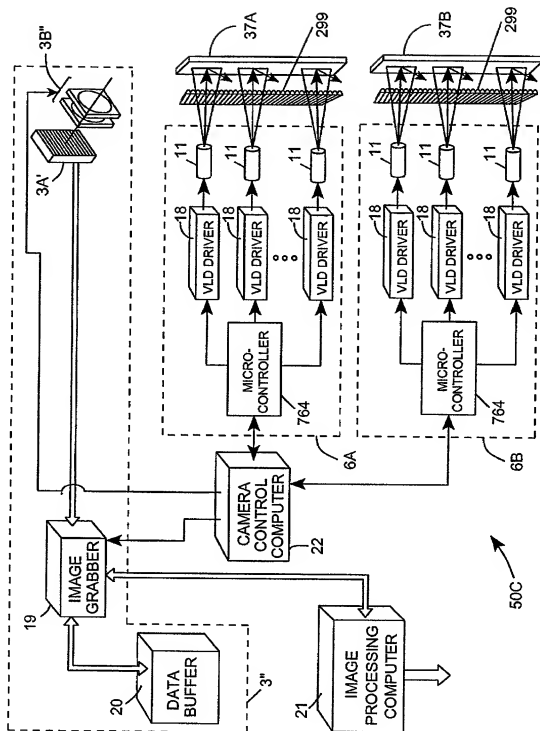


FIG. 3F2



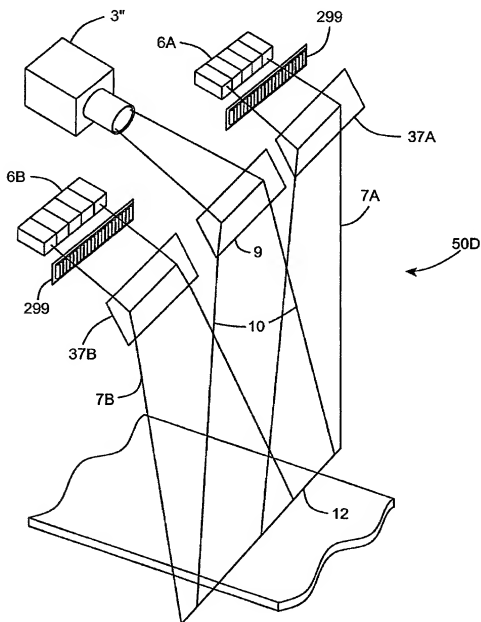


FIG. 3G1

10068803.100702



FIG. 3G2

202007*0889001

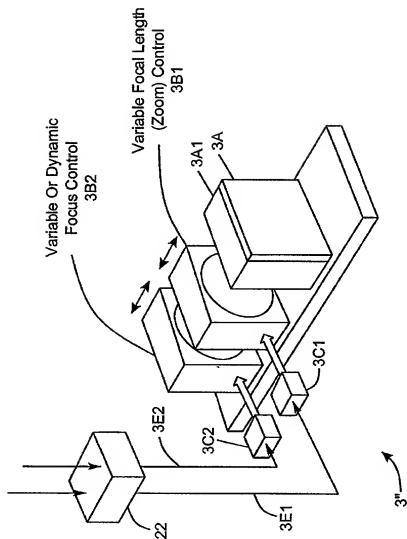


FIG. 3G3



- Variable Focal Length Imaging Lens
- Variable Focal Distance

- Variable Focal Length Imaging Lens
- Dynamic Focal Distance

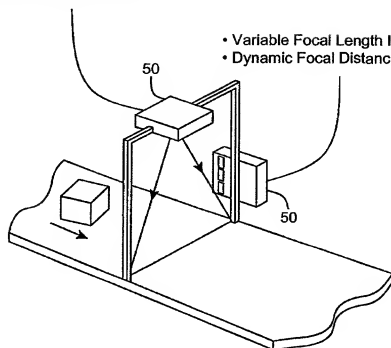


FIG. 3H

10058803.100702

202001*E0889001

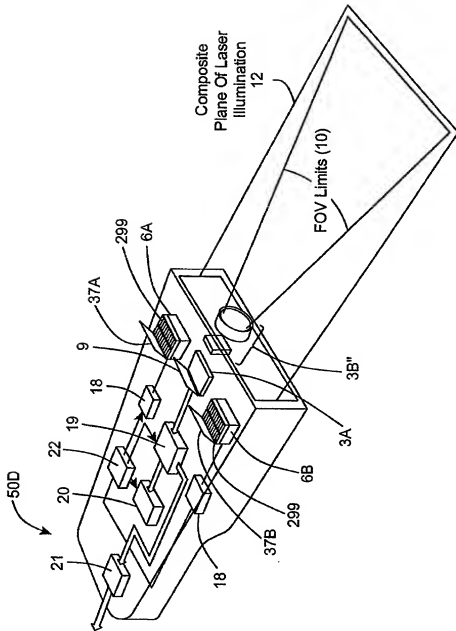


FIG. 3I

202001" 20889001

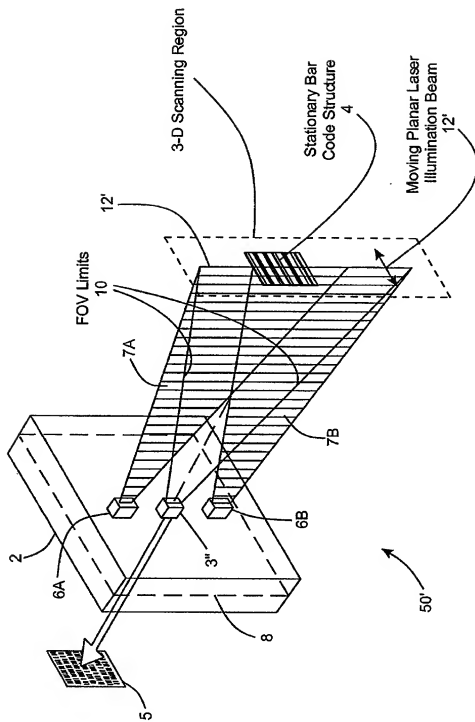


FIG. 3J1

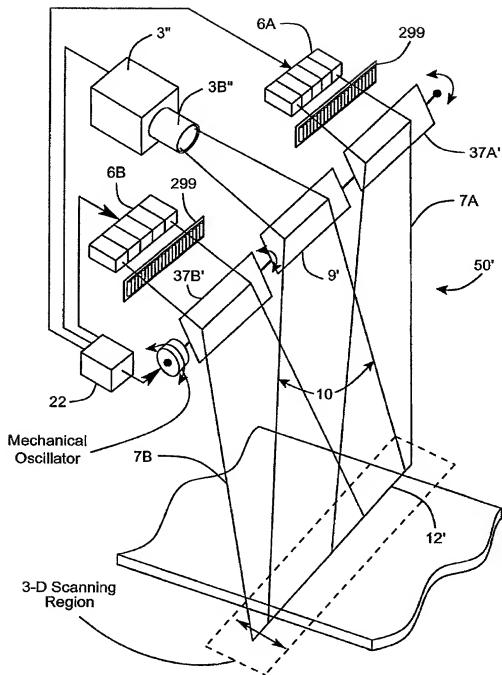


FIG. 3J2

10068803-100702



FIG. 3J3

202001-6089001

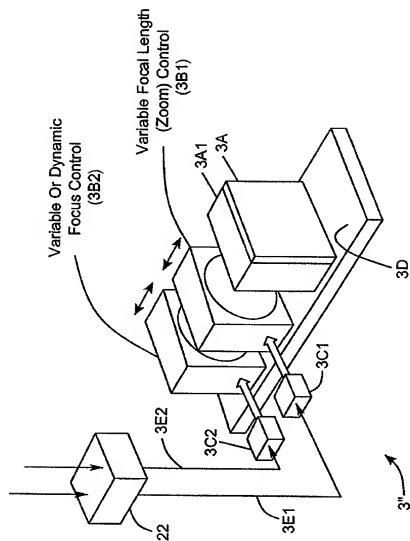
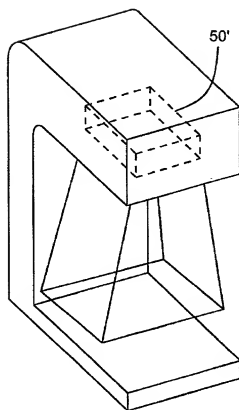


FIG. 3J4



- Hand-Held Scanner
- Presentation Scanner

FIG. 3J5



2-D Hold-under Scanner

FIG. 3J6

10058803.100702



2007001-00000001

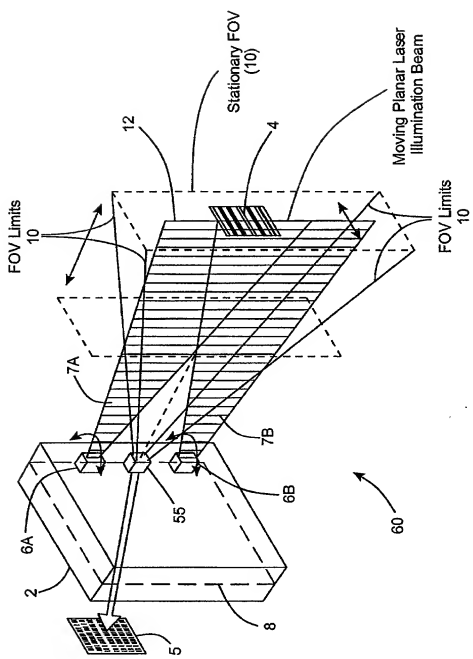


FIG. 4A

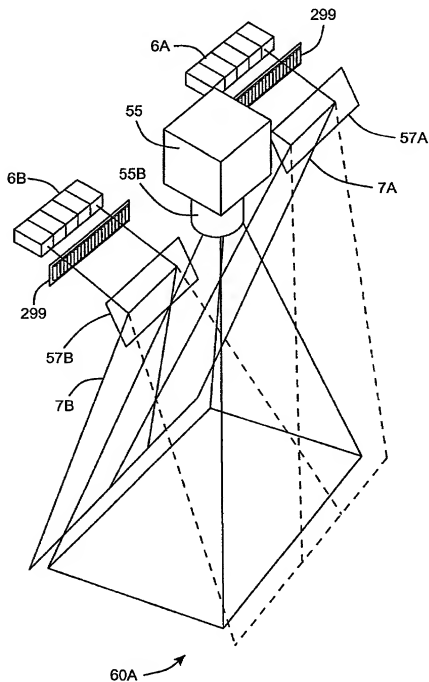


FIG. 4B1

10068803, 100702

200007-0089901

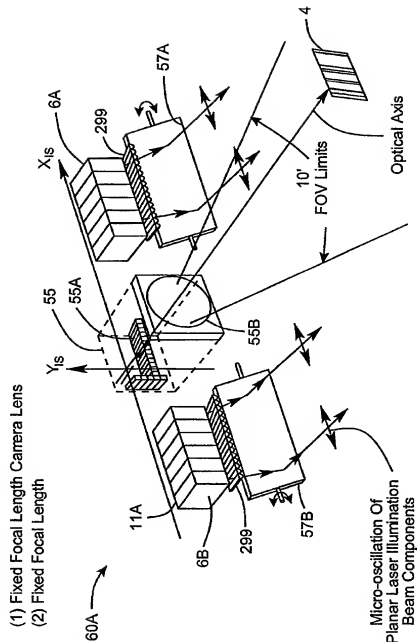


FIG. 4B2



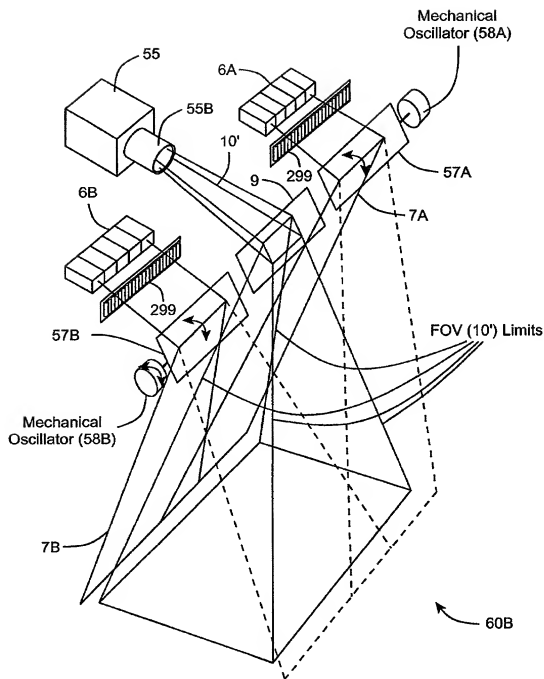


FIG. 4C1

10058803.100702

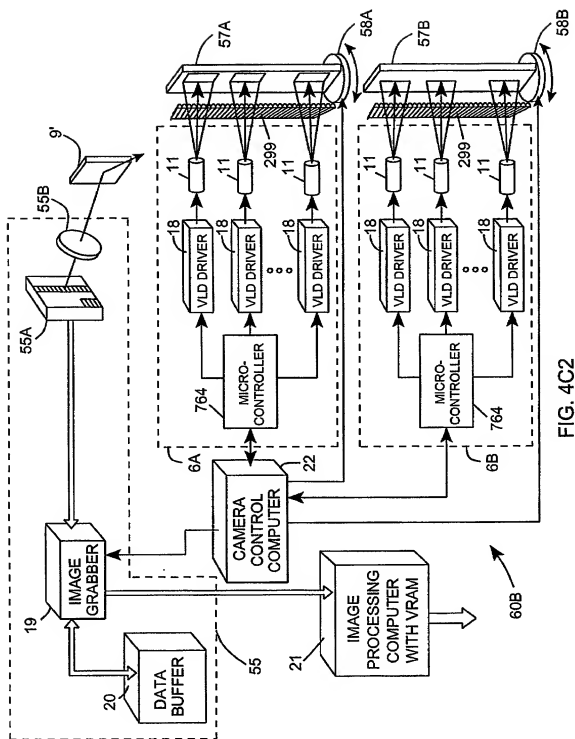
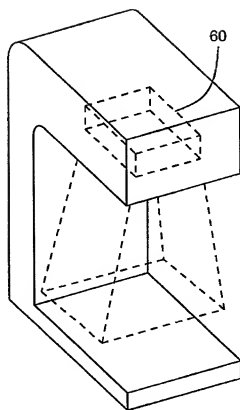


FIG. 4C2



2-D Hold-under Scanner

FIG. 4D

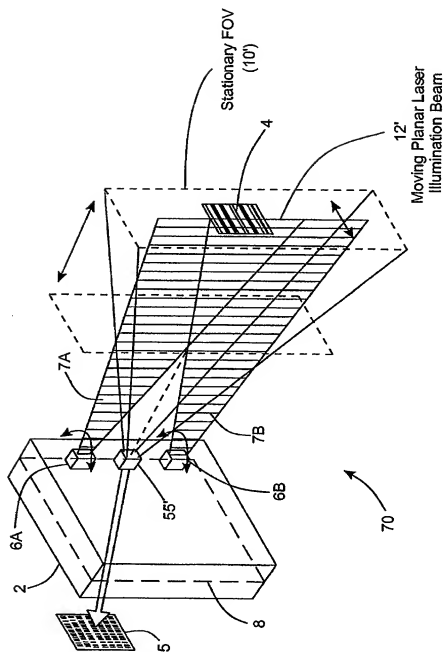
10068803.100702



- Hand-held Scanner
- Presentation Scanner

FIG. 4E

20200170889001



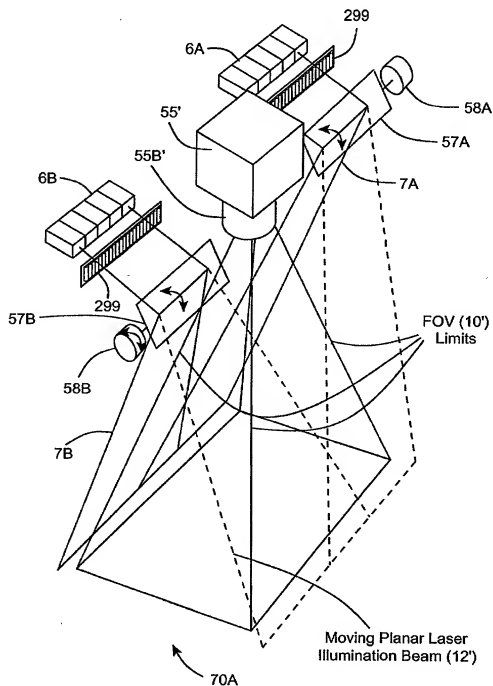


FIG. 5B1

10068803.100702

202001-50889001

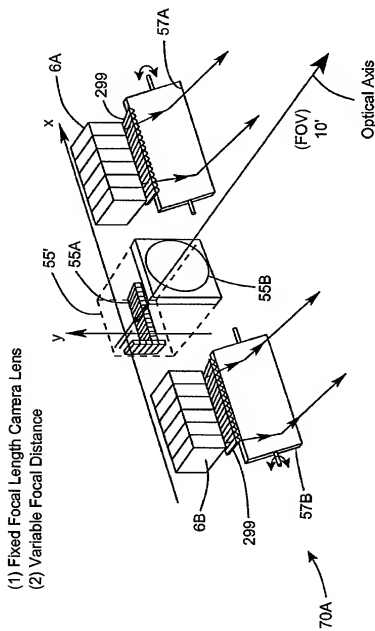


FIG. 5B2

202001" 0089001

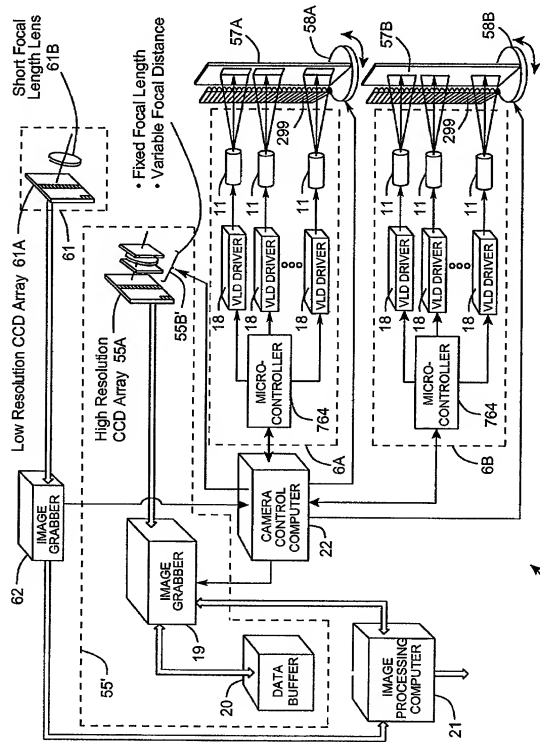


FIG. 5B3

70A

202007-20899001

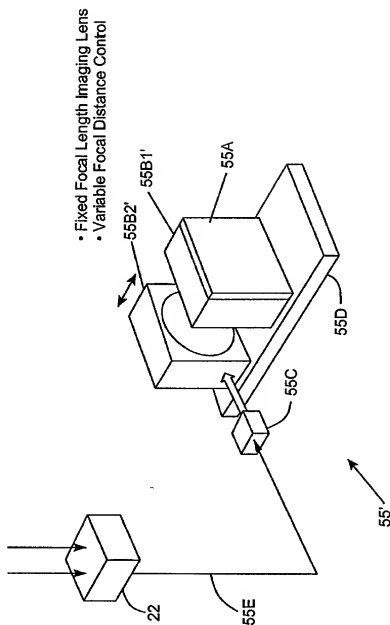


FIG. 5B4

10068803.100702

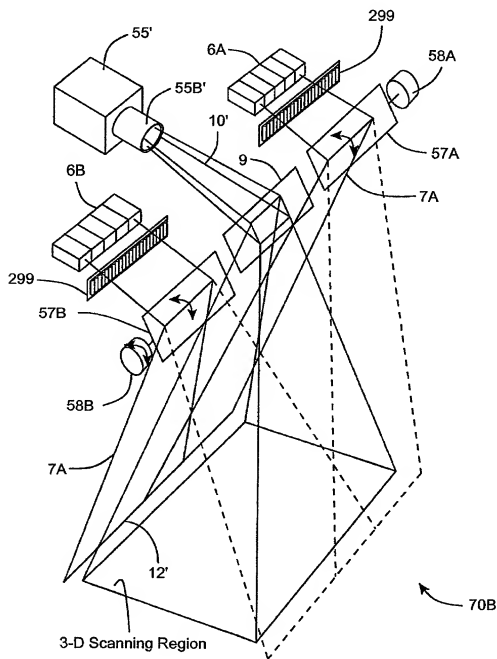


FIG. 5C1



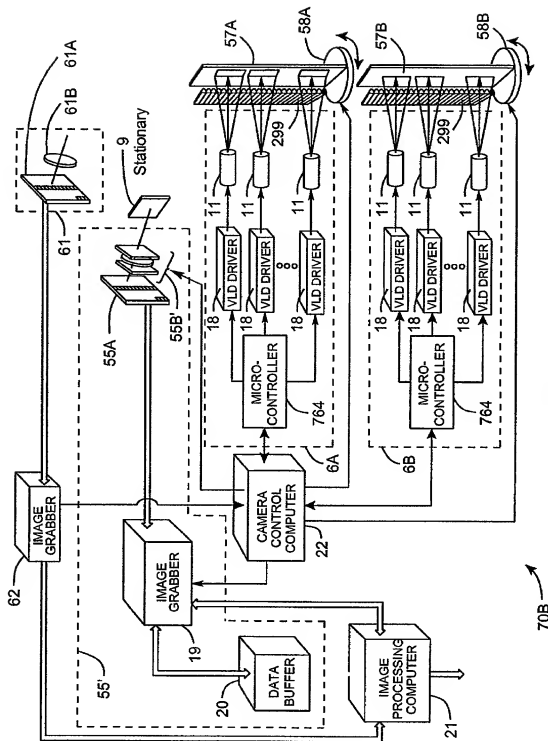


FIG. 5C3

202007-08999007

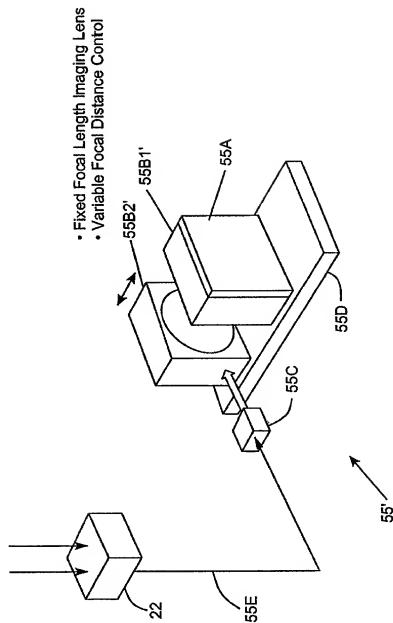


FIG. 5C4

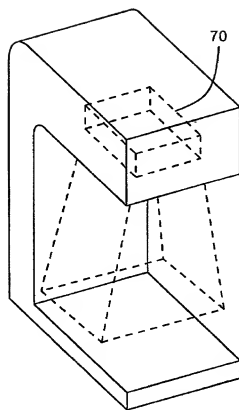


FIG. 5D

10068803.100702

2020017000001

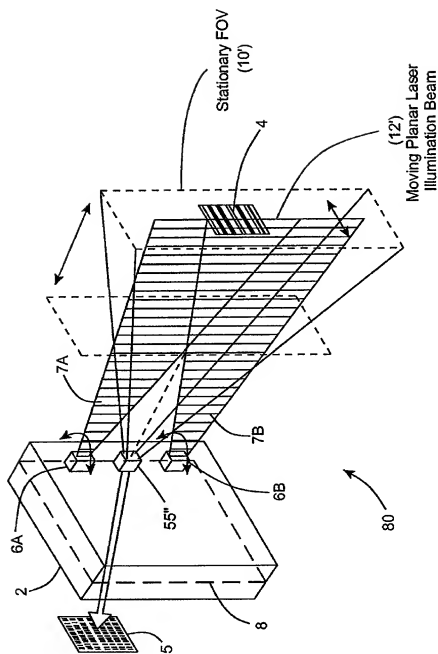


FIG. 6A

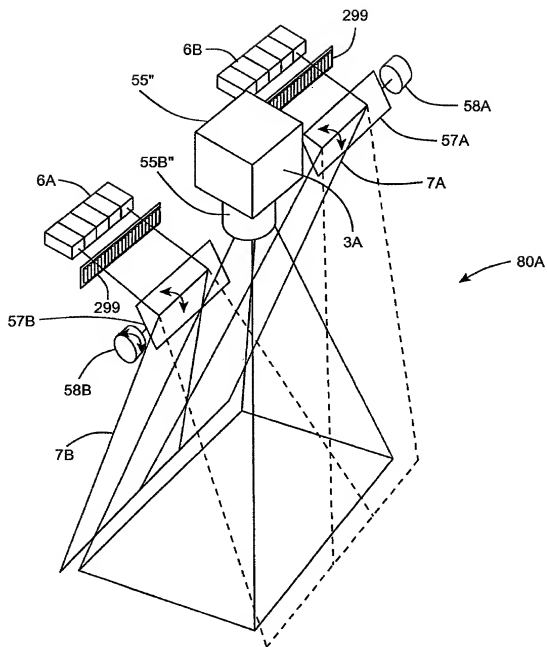


FIG. 6B1

10068803.100702

202007-50889001

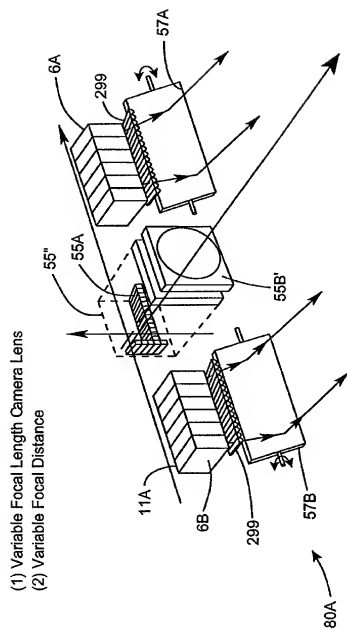


FIG. 6B2

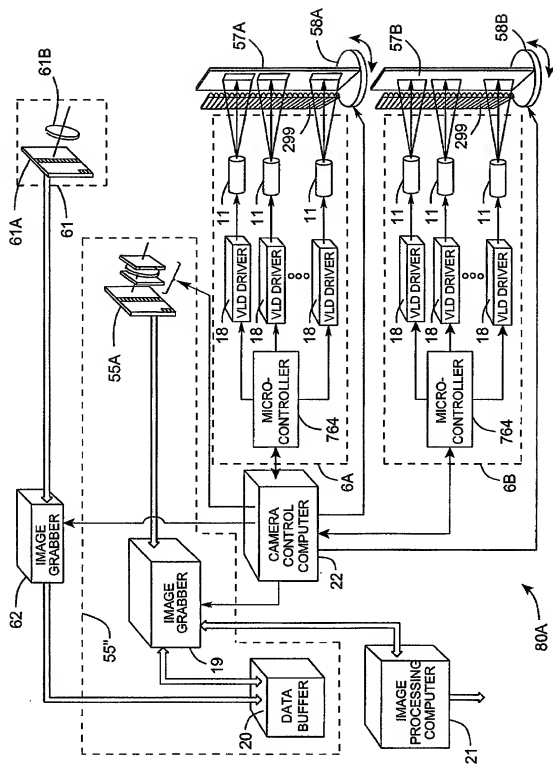


FIG. 6B3

202001*2089001

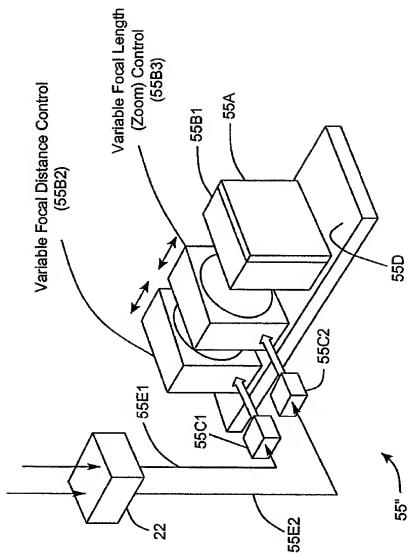


FIG. 6B4

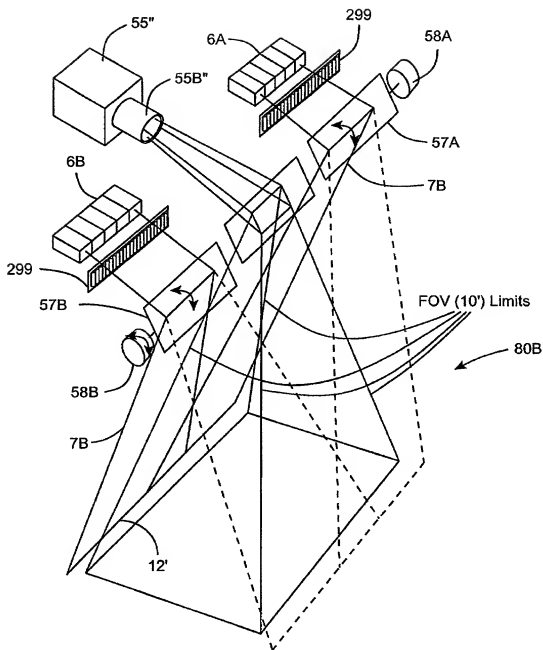


FIG. 6C1

10058803.100702

-

FIG. 6C2



80B

202007-60899001

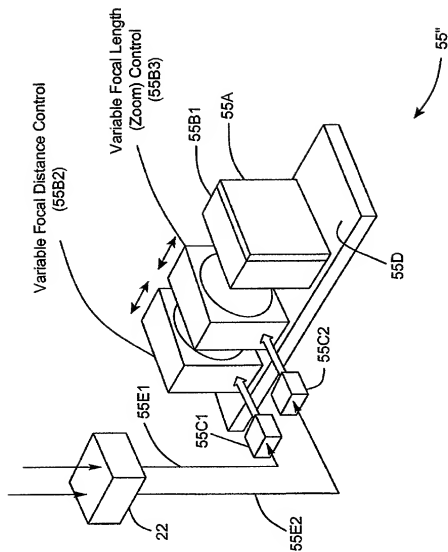


FIG. 6C4

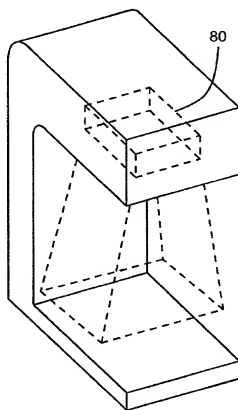


FIG. 6C5

10058803.100702



FIG. 6D1

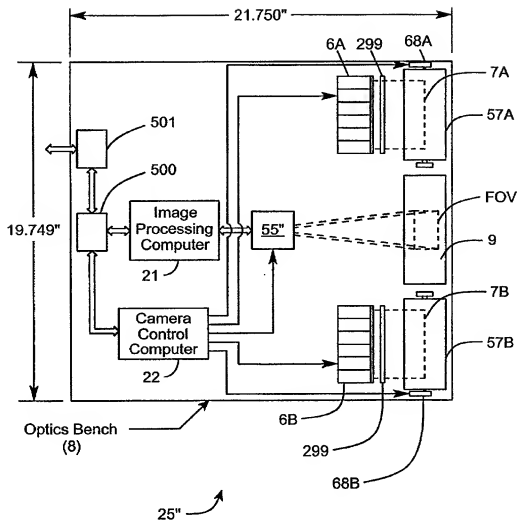


FIG. 6D2

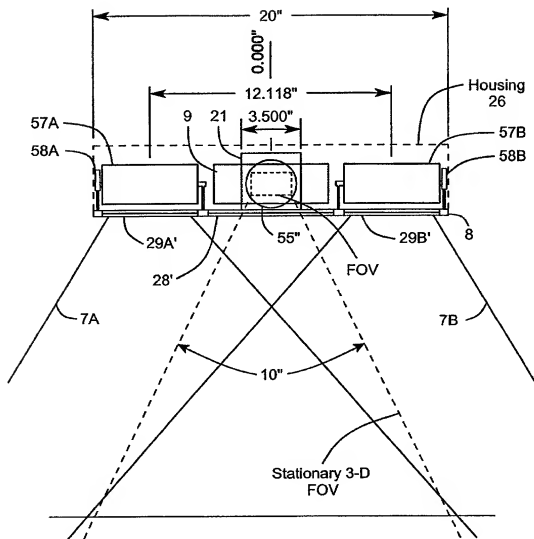


FIG. 6D3

10068803.100702

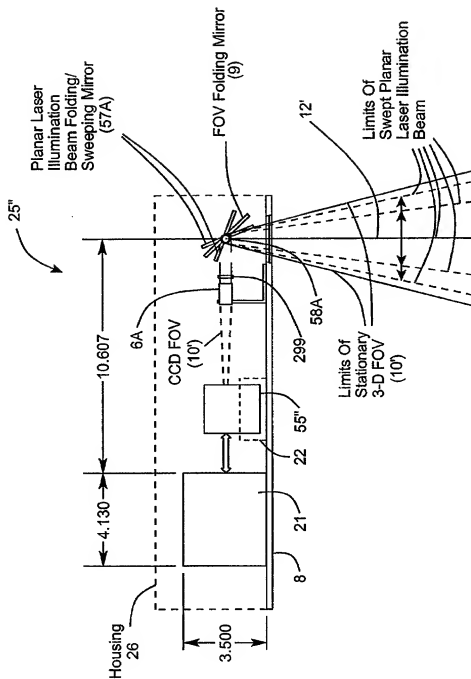


FIG. 6D4



* Variable FOV

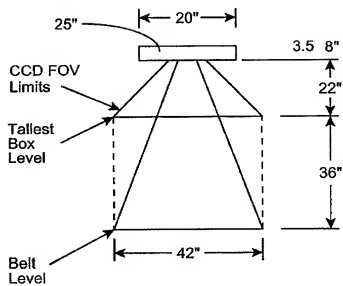


FIG. 6D5

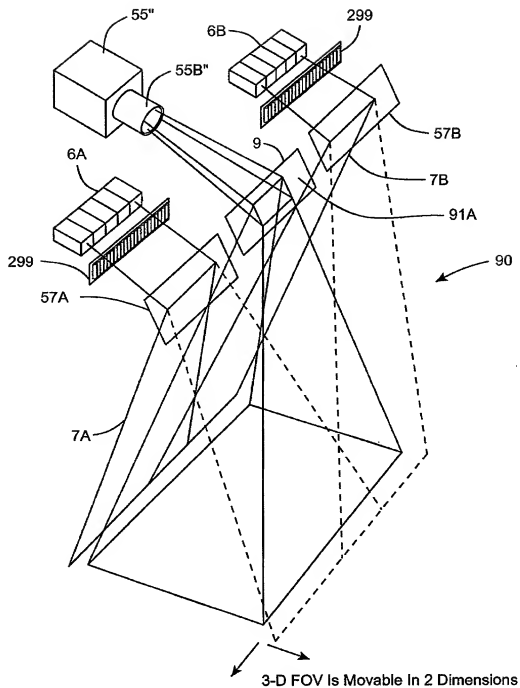


FIG. 6E1

10068803.100702



202007*008900T

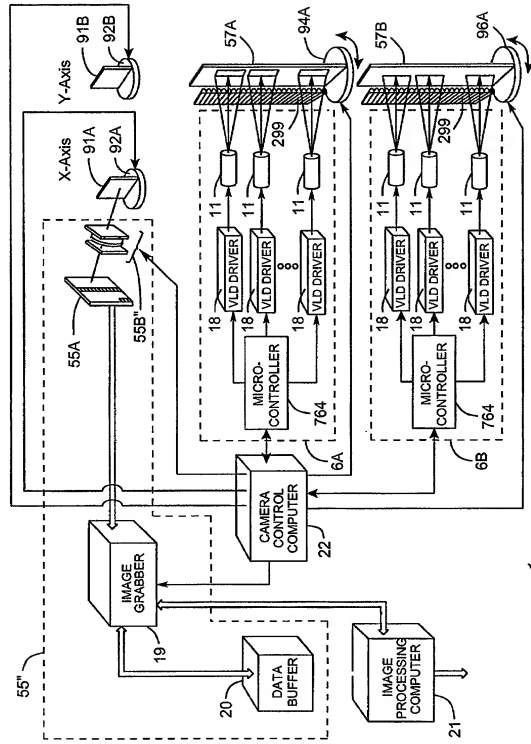


FIG. 6E3

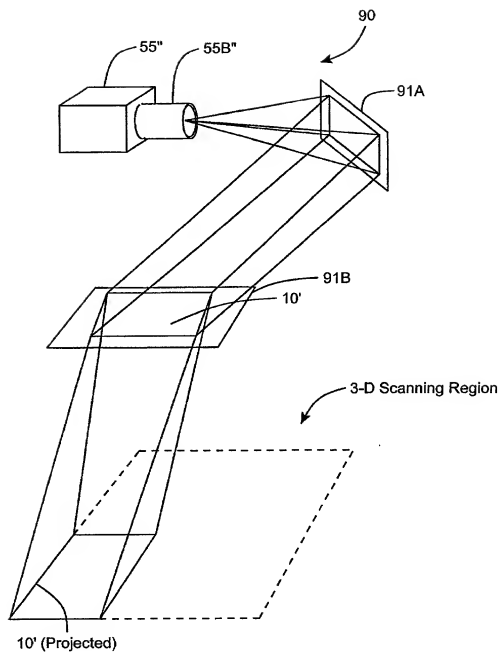


FIG. 6E4

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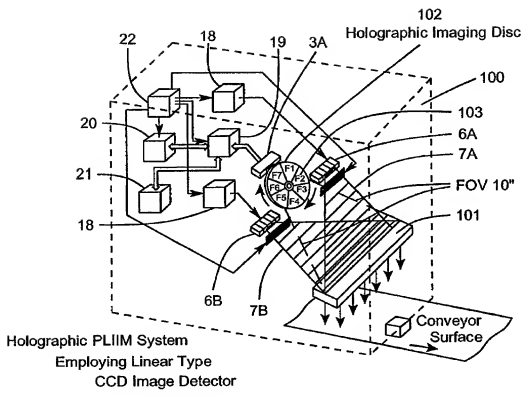


FIG. 7A

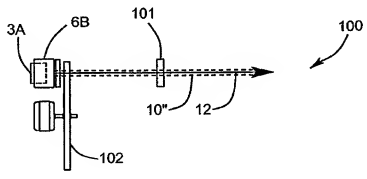


FIG. 7B

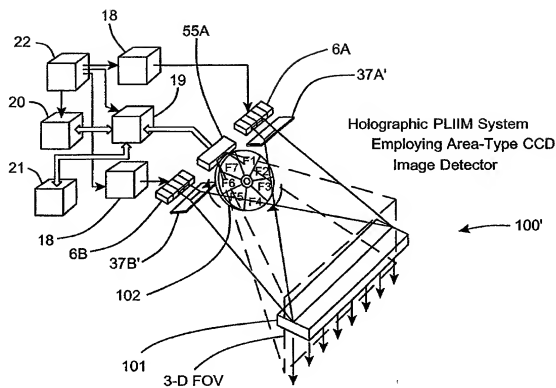


FIG. 8A

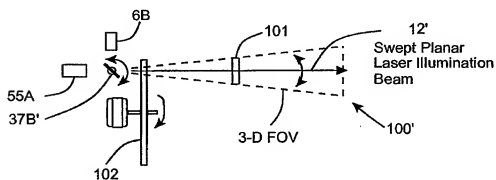


FIG. 8B

1-D Scanner Embodiment

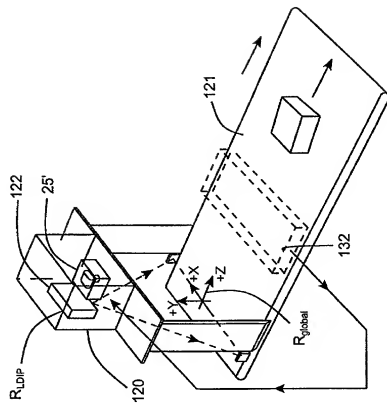


FIG. 9

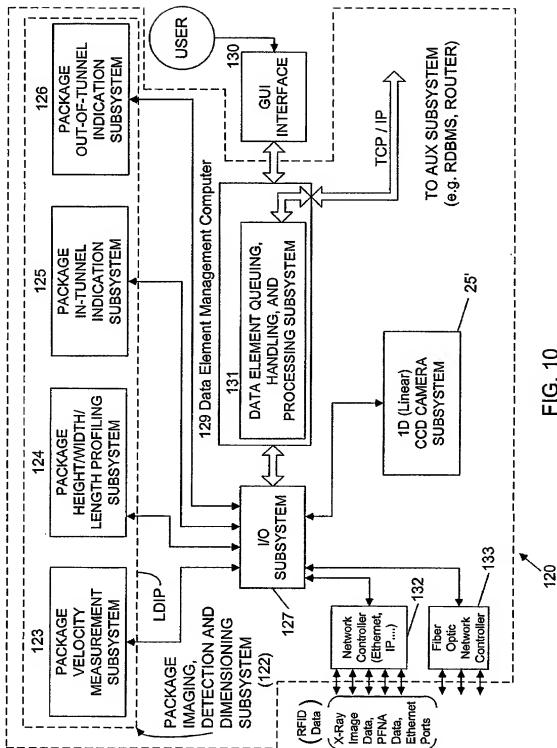


FIG. 10

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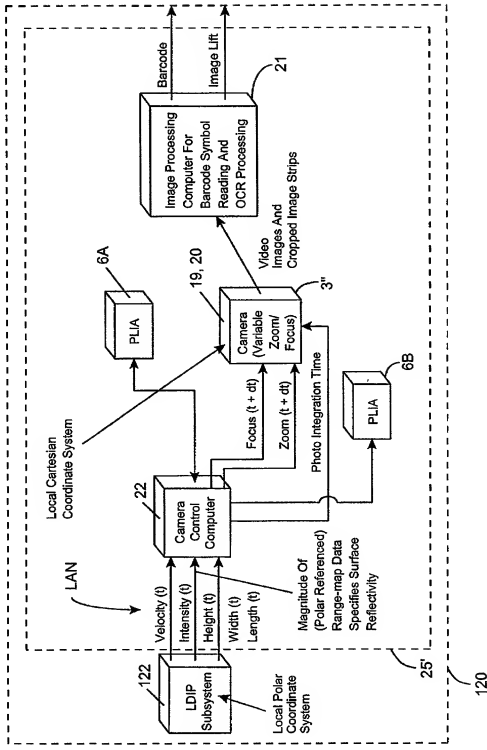


FIG. 11



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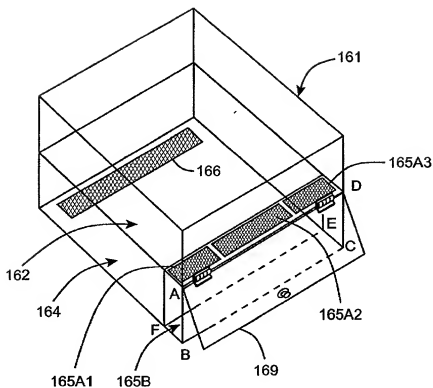


FIG. 12A

202001*0089001

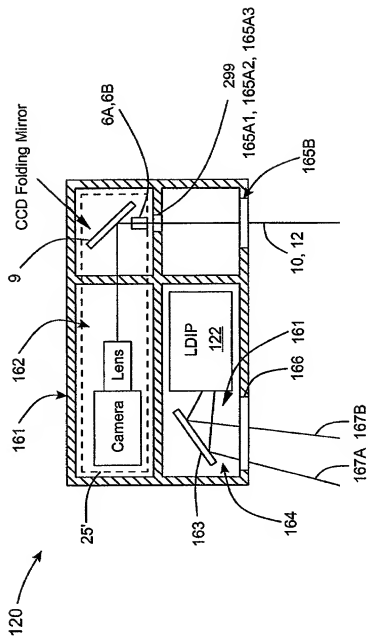


FIG. 12B

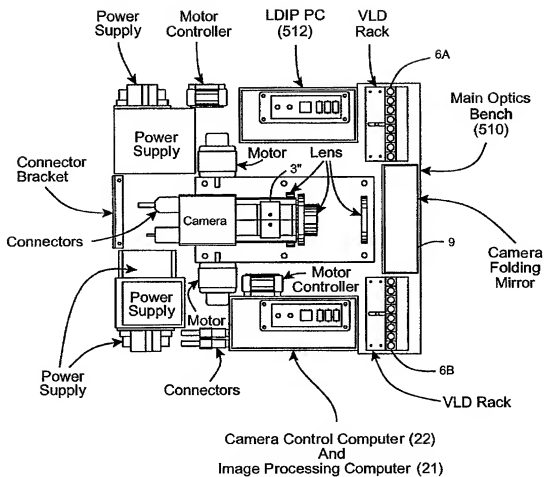


FIG. 12C

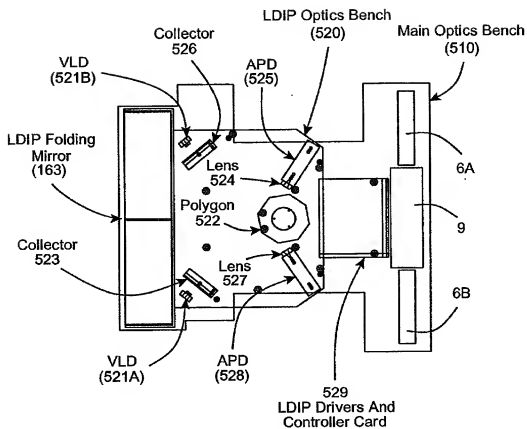
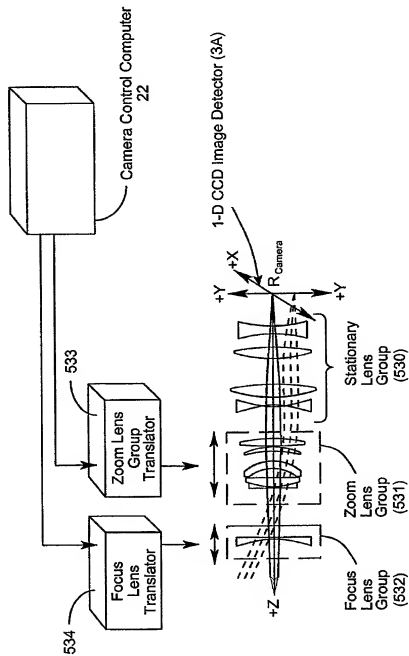


FIG. 12D

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Main Optics Lens Groups

FIG. 12E



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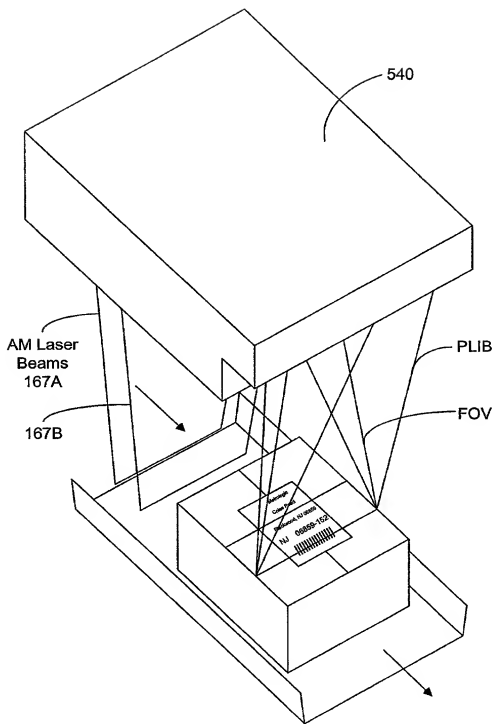


FIG. 13A

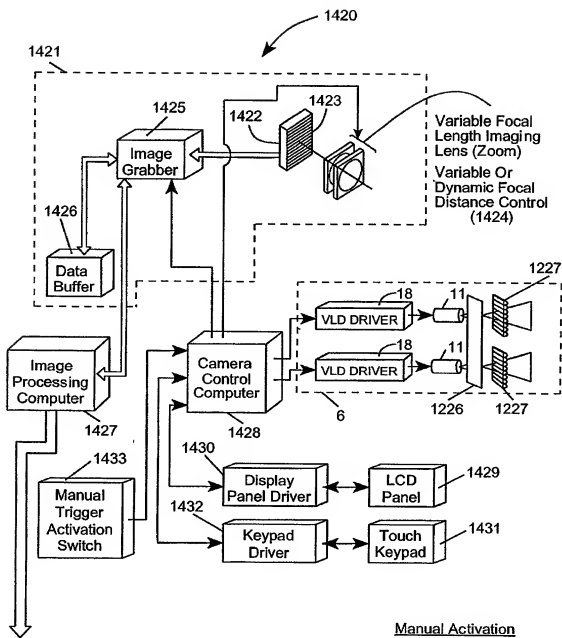


FIG. 40C1

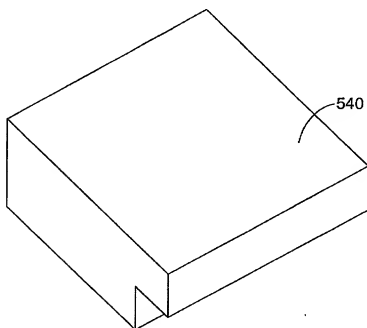


FIG. 13B

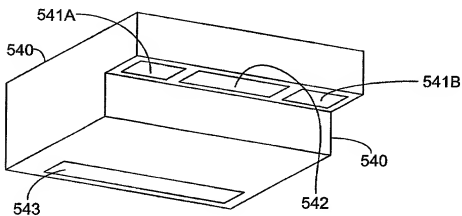


FIG. 13C

10068803-100702

PLIIM-BASED PACKAGE IDENTIFICATION AND
DIMENSIONING (PID) SYSTEM

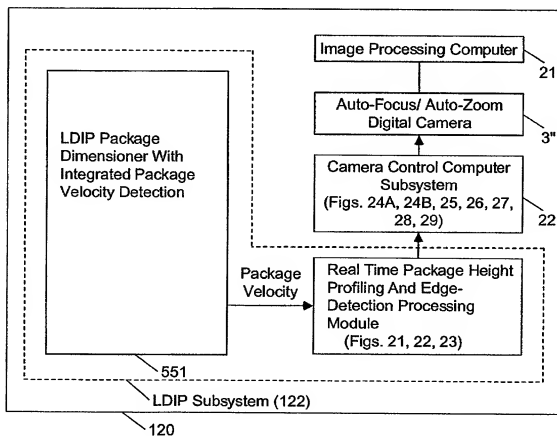


FIG. 14

LDIP REAL-TIME PACKAGE HEIGHT PROFILE AND EDGE DETECTION METHOD

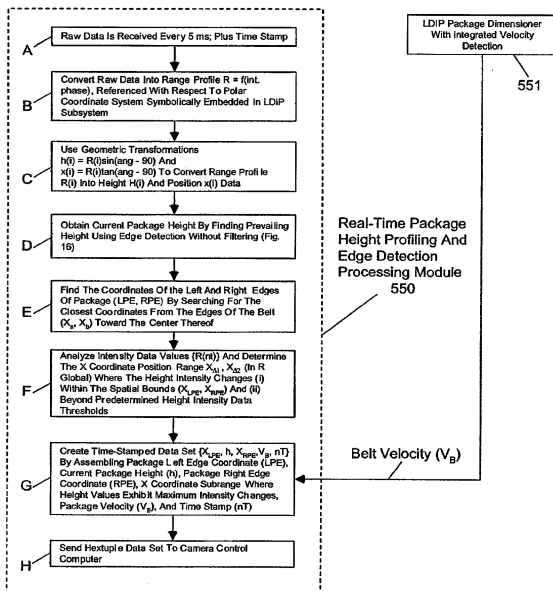
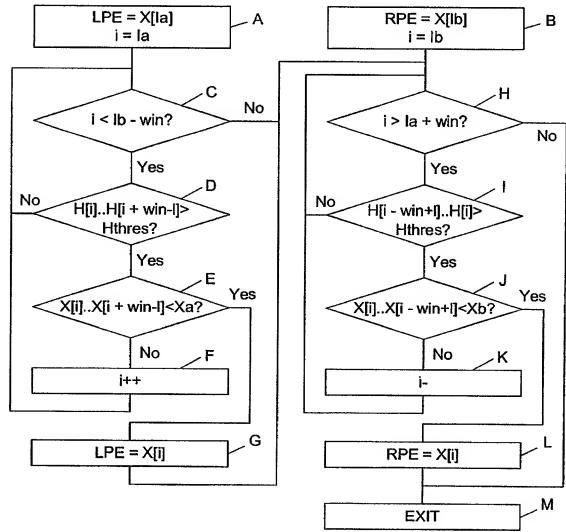


FIG. 15

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LDIP REAL-TIME PACKAGE EDGE DETECTION



Xa = Location Of Belt Left Edge; Xb = Location Of Belt Right Edge
 la = Belt Left Edge Pixel; lb = Belt Right Edge Pixel
 LPE = Left package Edge; RPE = Right Package Edge
 H[] = Pixel Height Array; X[] = Pixel Location Array
 win = Package detection Window

FIG. 16

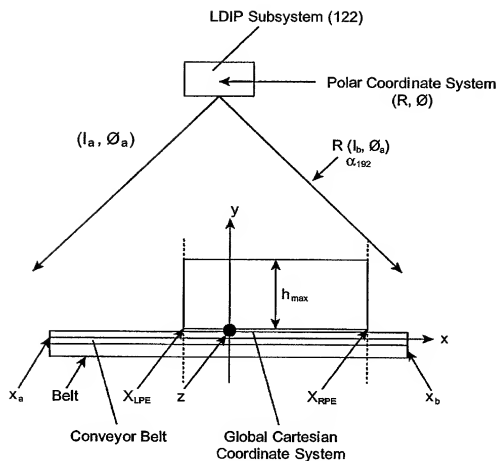


FIG. 17



Information Measured At Scan Angles Before Coordinate Transformations

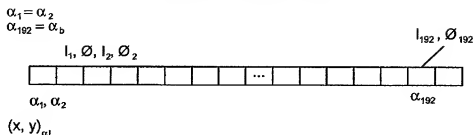


FIG. 17A

Range And Polar Angle Measures Taken At Scan Angle α Before Coordinate Transforms

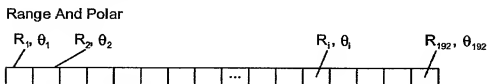


FIG. 17B

Measured Package Height And Position Values After Coordinate Transforms

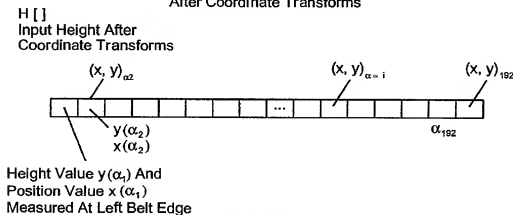


FIG. 17C

CAMERA CONTROL PROCESS CARRIED OUT WITHIN THE CAMERA
CONTROL SUBSYSTEM OF EACH OBJECT IDENTIFICATION AND
ATTRIBUTE ACQUISITION SYSTEM OF PRESENT INVENTION

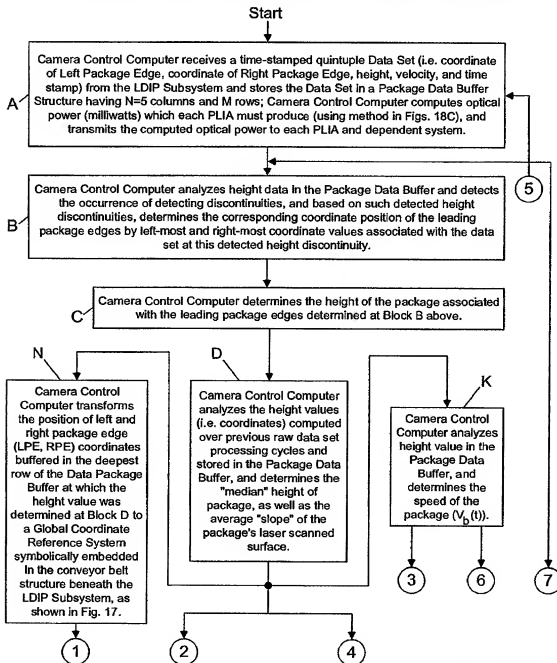


FIG. 18A

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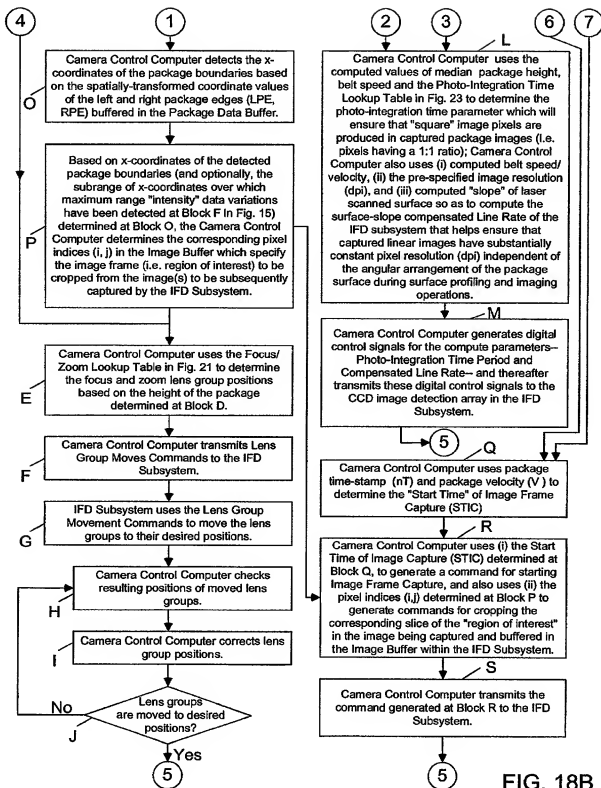


FIG. 18B



METHOD OF COMPUTING OPTICAL OUTPUT POWER FROM LASER
DIODES IN A PLANAR LASER ILLUMINATION ARRAY (PLIA) FOR
CONTROLLING THE CONSTANT WHITE-LEVEL IN IMAGE PIXELS
CAPTURED BY A PLIIM-BASED LINEAR IMAGER

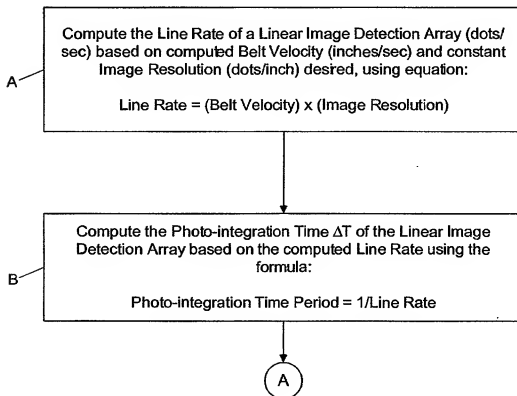


FIG. 18C1



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A



Compute the Optical Power (milliwatts) of each PLIA based on the computed Photo-integration Time Period (ΔT) using the following formula:

$$\text{Optical Power of VLD (milliwatts)} = \frac{\text{constant}}{\text{Photo-integration Time Period } \Delta T}$$

FIG. 18C2

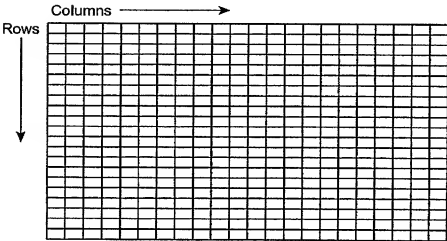


X Coordinate Subrange Where
Maximum Range "Intensity"
Variations Have Been Detected

Left Package Edge (LPE)	Package Height (h)	Right Package Edge (RPE)	Package Velocity	Time-Stamp (nT)	
					Row 1
					Row 2
					Row 3
					Row 4
					Row 5
					Row M

Package Data Buffer (FIFO)

FIG. 19



Camera Pixel Data Buffer
Pixel Indices (i, j)

FIG. 20

2020015089901



**Zoom And Focus Lens Group Position
Look-Up Table**

Distance From Camera H (mm)	Zoom Group Distance (mm) Y (Zoom)	Focus Group Distance (mm) Y (Focus)
1000	21.57489228	2.47E+05
1100	19.35089696	10.95009783
1200	17.10734344	20.85763177
1300	14.78385644	30.81671925
1400	12.32158355	38.47312555
1500	9.979114359	42.87645436
1600	7.540039114	48.44003358
1700	5.075754775	53.25498931
1800	2.595589396	57.40834303
1900	0.098972739	60.96883615

FIG. 21

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* Note: The focal distance and zoom (eff. focal length) of camera lens are coupled (inter-dependant) in this commercial embodiment.

Camera Has A Fixed Aperture F56

Focus And Zoom Lens Movement vs. Working Distances

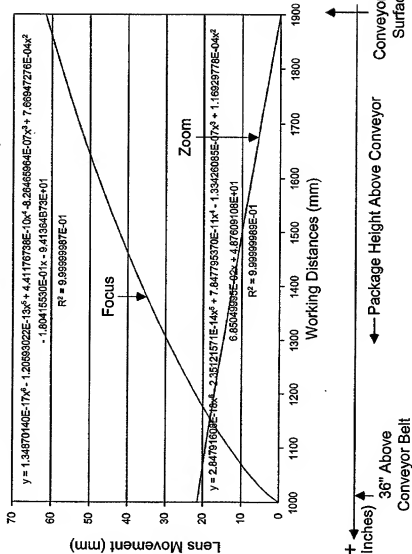


FIG. 22

202001" E0889001



Photo-Integration Time Look-Up Table

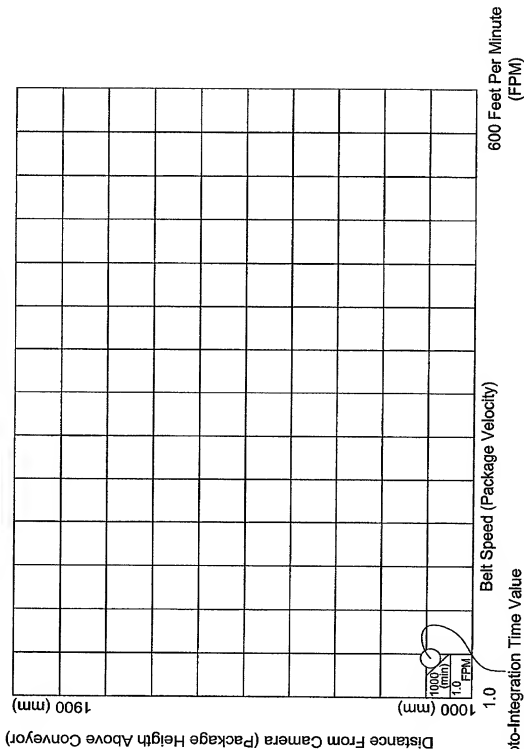


Photo-Integration Time Value
That Ensures Square Image
Pixels (1:1 aspect ratio)

FIG. 23

2006801-000001

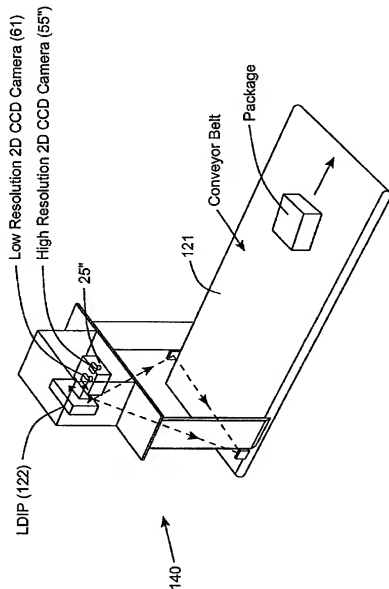


FIG. 24

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200001-50899001

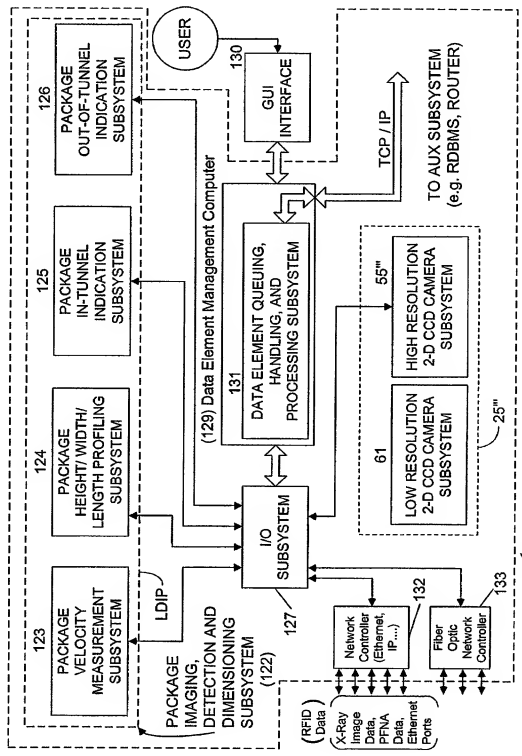


FIG. 25

2006001*0089001

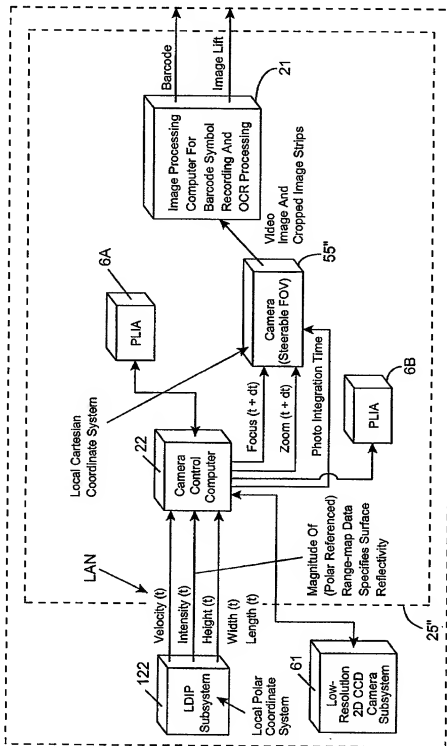


FIG. 26

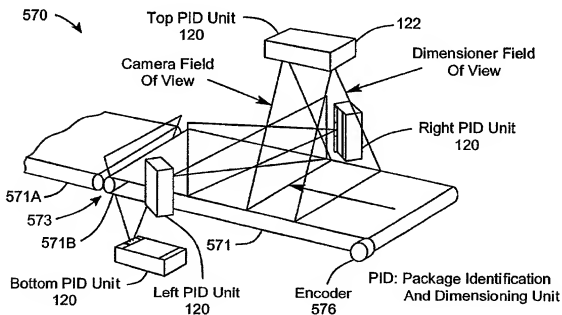


FIG. 27

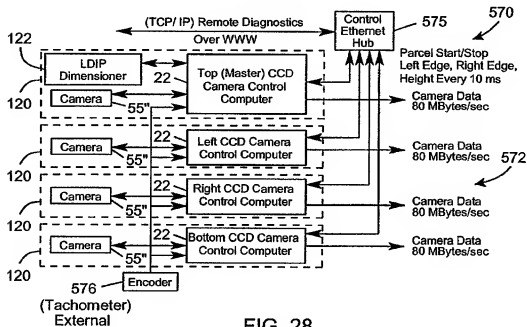


FIG. 28

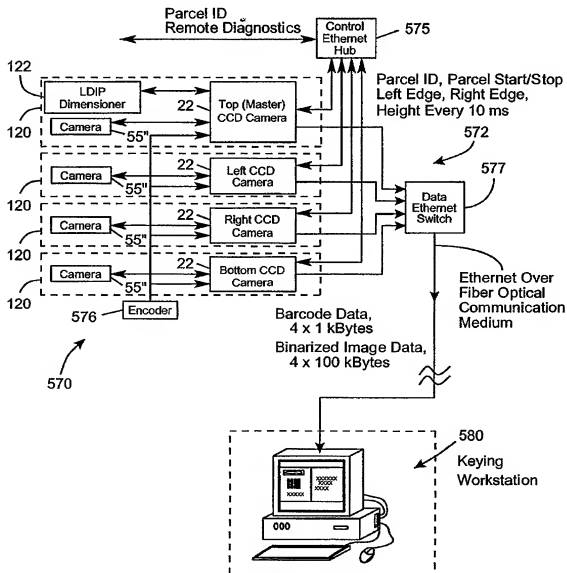


FIG. 29

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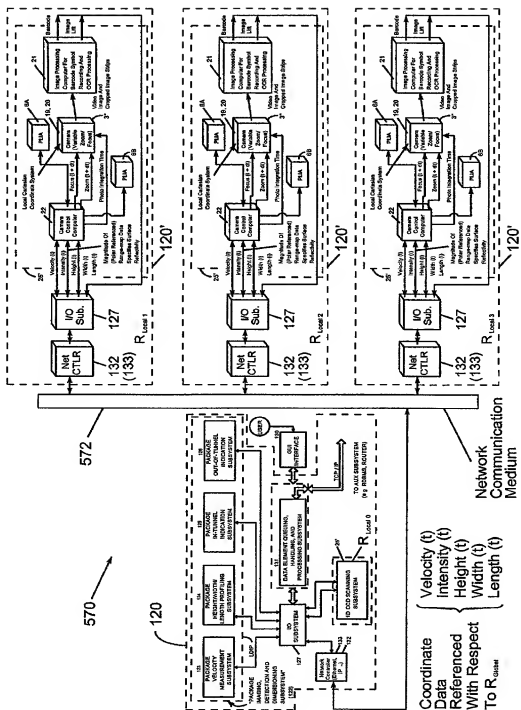


FIG. 30

200001"ED88001

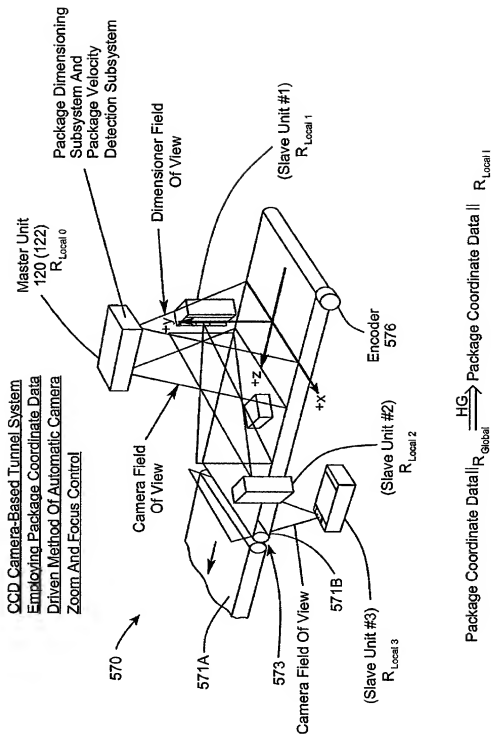


FIG. 31

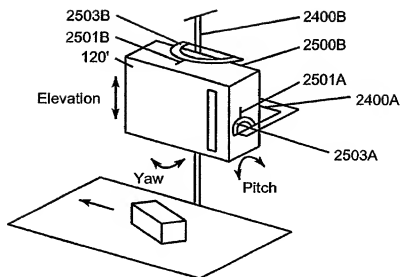


FIG. 31A

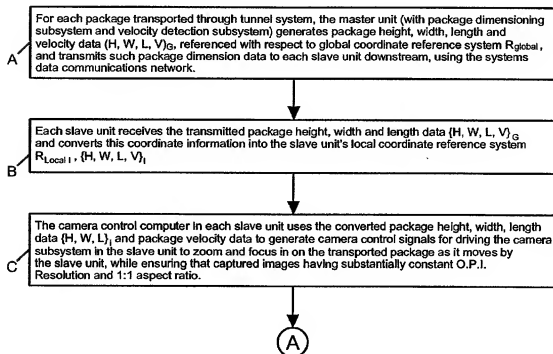


FIG. 32A



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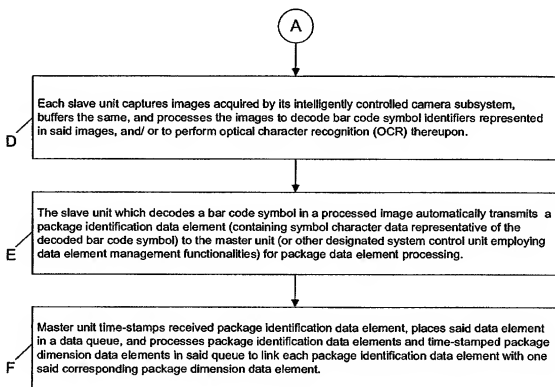


FIG. 32B

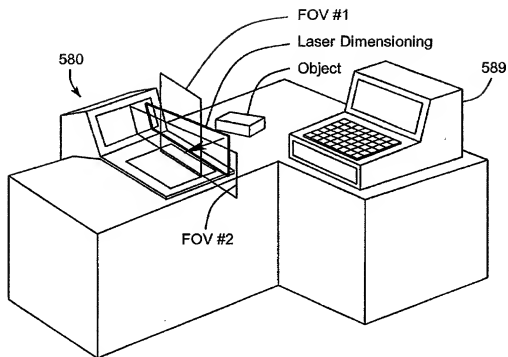


FIG. 33A

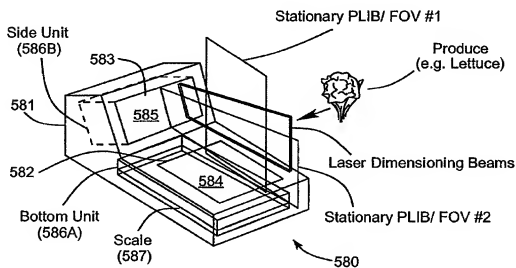


FIG. 33B



FIG. 33C1

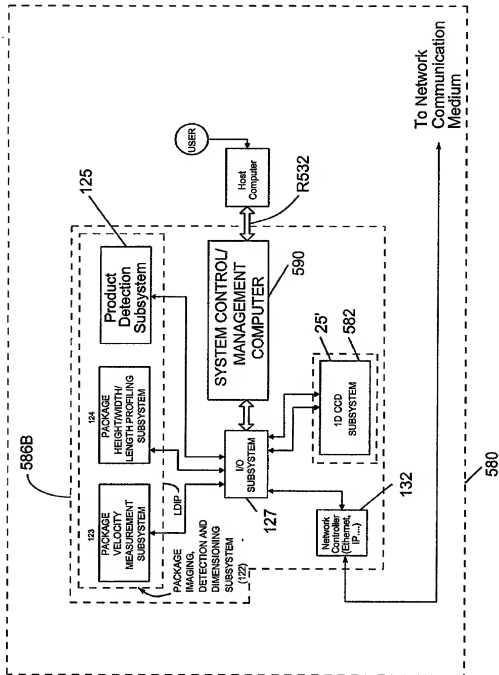


FIG. 33C2

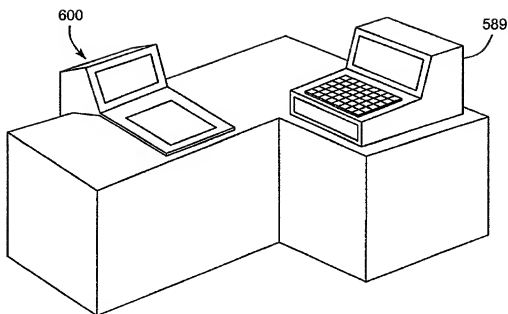


FIG. 34A

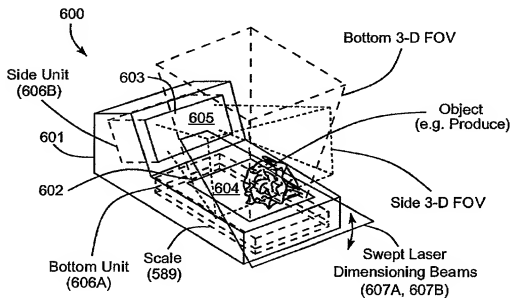
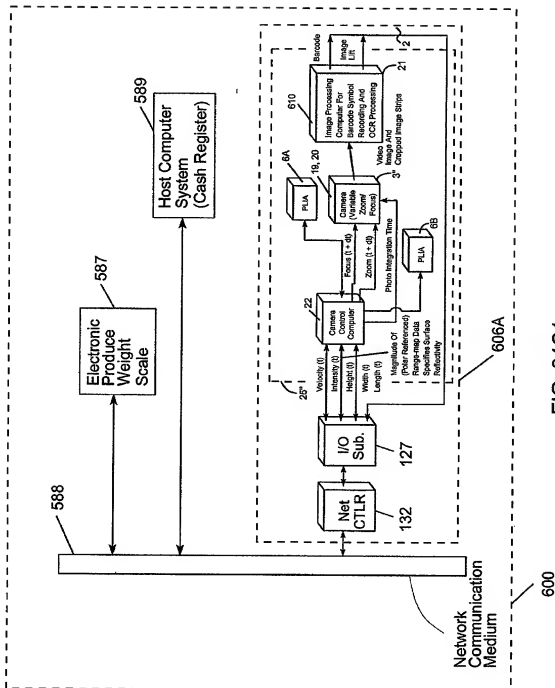


FIG. 34B

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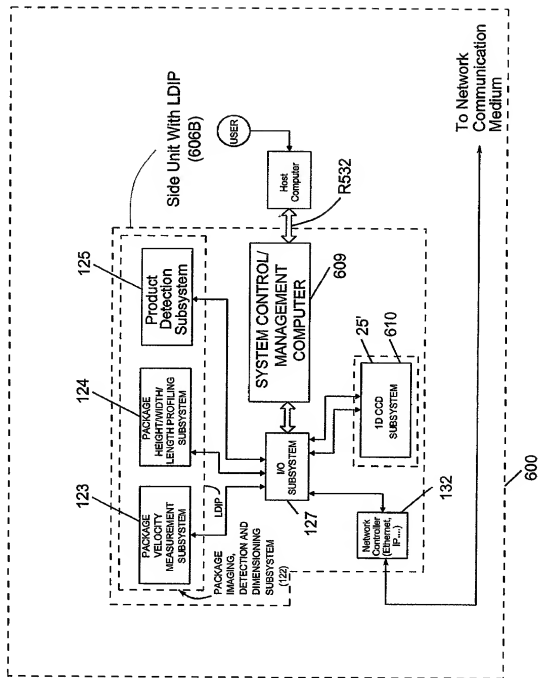


FIG. 34C2

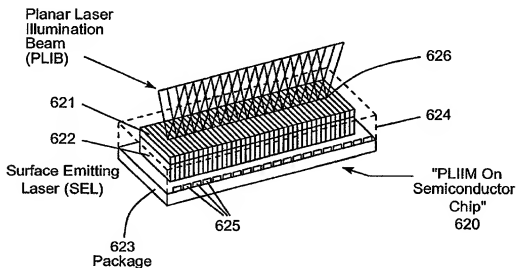


FIG. 35A

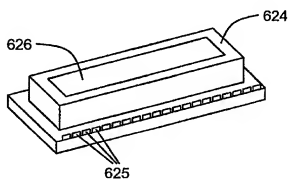


FIG. 35B

200001-0089001

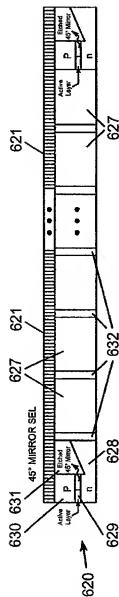


FIG. 36A

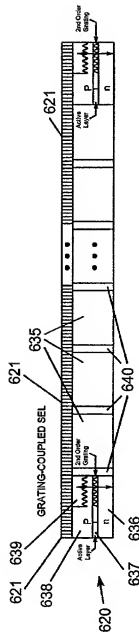


FIG. 36B

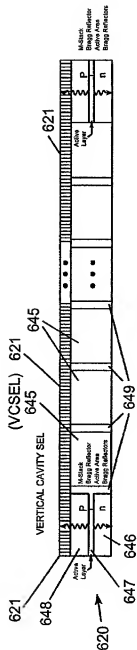


FIG. 36C

10068803.100702

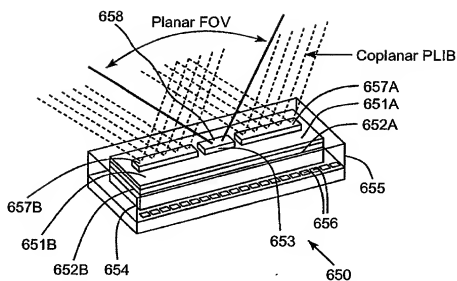


FIG. 37

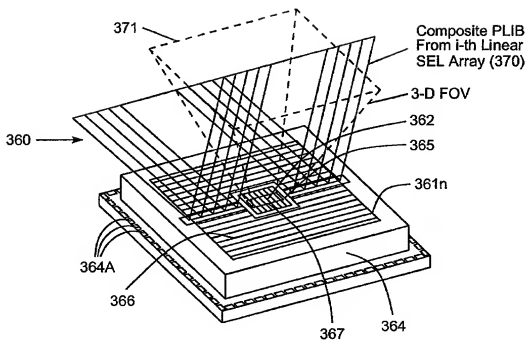


FIG. 38A

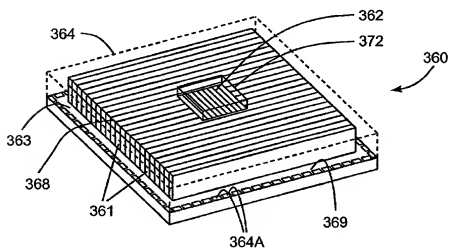


FIG. 38B

10068803-100702

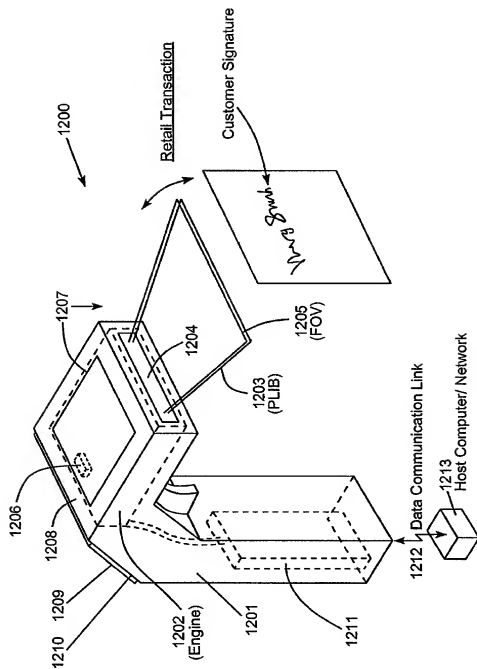


FIG. 39A

10068803.100702

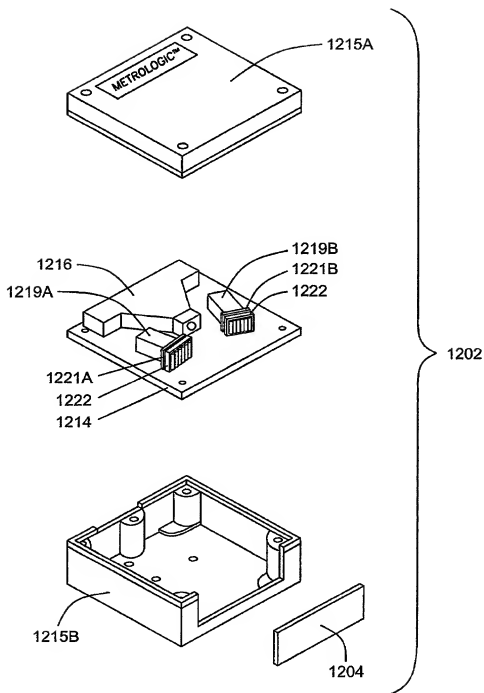


FIG. 39B

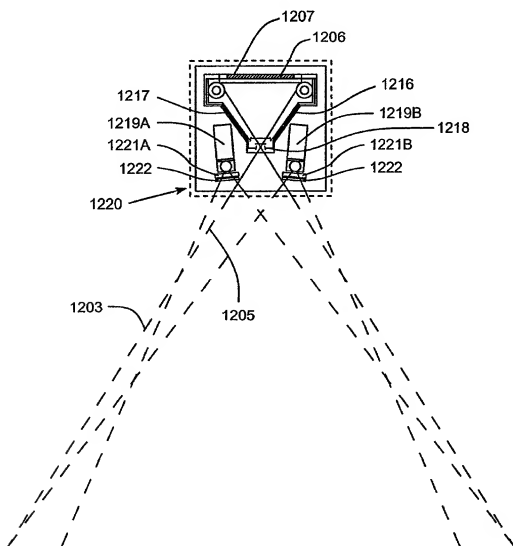


FIG. 39C

207001-000000

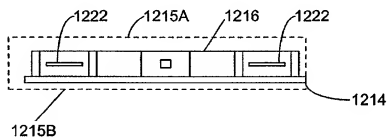


FIG. 39D

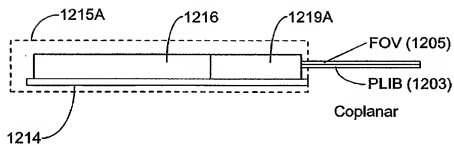


FIG. 39E

1005803-100702

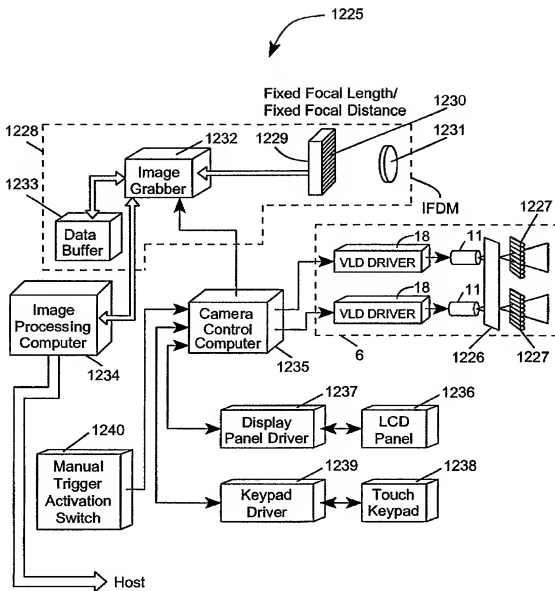
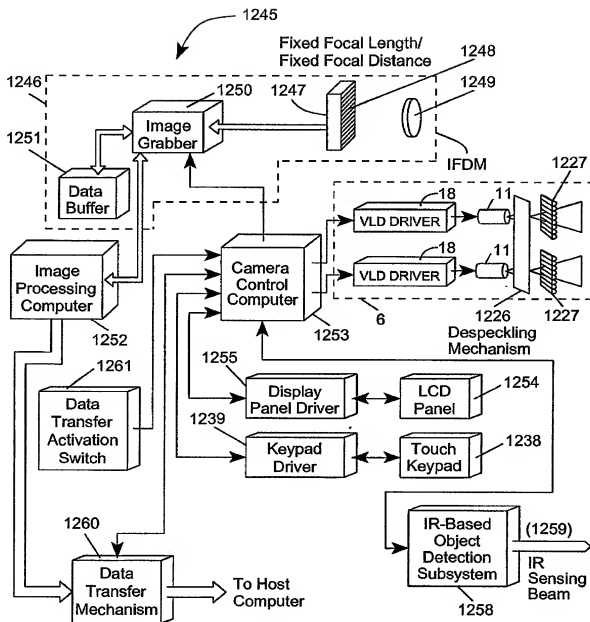
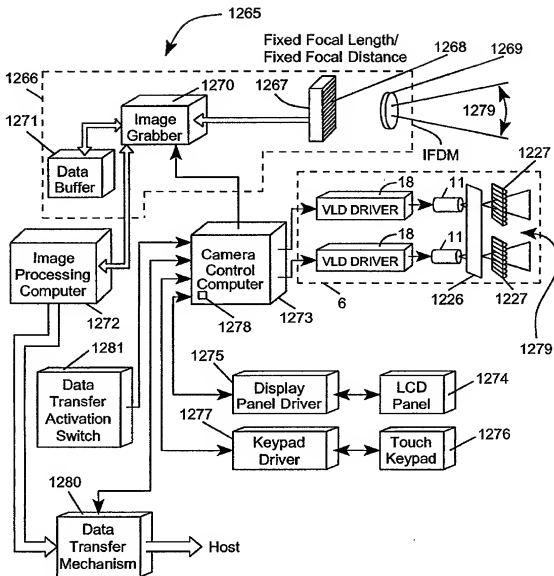


FIG. 40A1



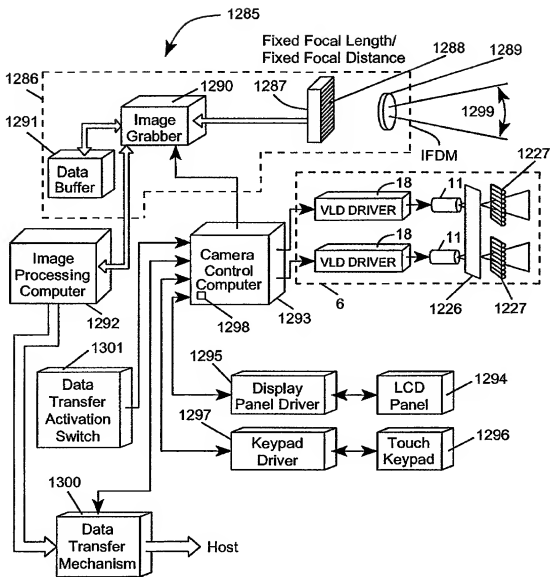
Automatic with IR Object Detection

FIG. 40A2



Automatic with Laser Based Object Detection

FIG. 40A3



Automatic with Passive CCD
 Based Object Detection

FIG. 40A4

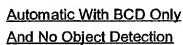
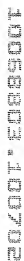


FIG. 40A5



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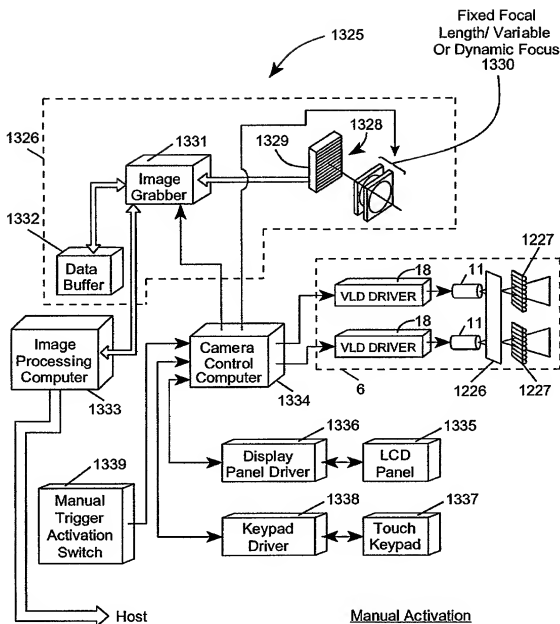


FIG. 40B1

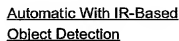


FIG. 40B2

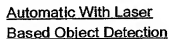
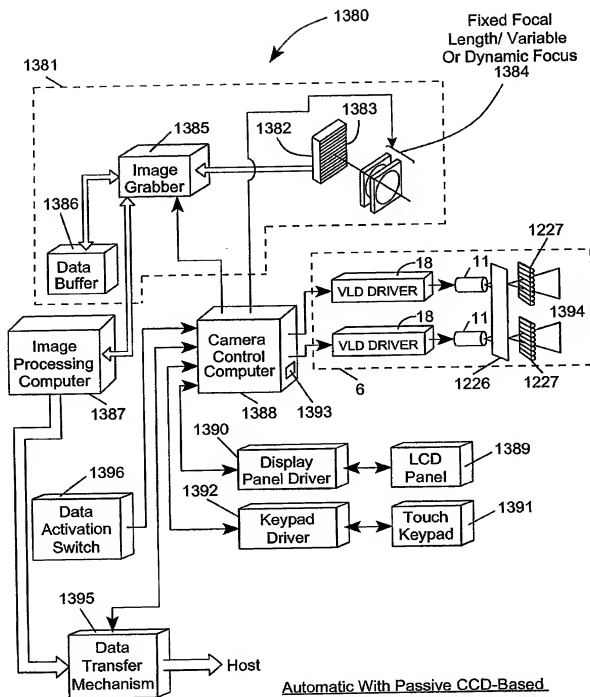


FIG. 40B3

20068803.100702

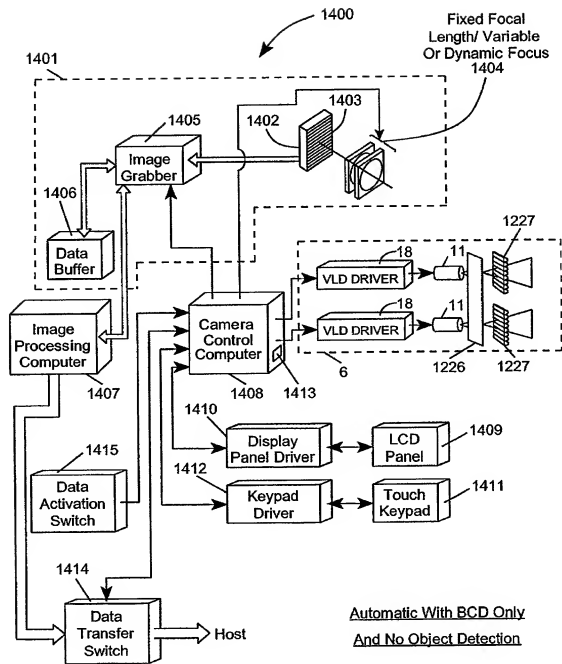


Automatic With Passive CCD-Based
 Object Detection

FIG. 40B4

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Automatic With BCD Only
 And No Object Detection

FIG. 40B5

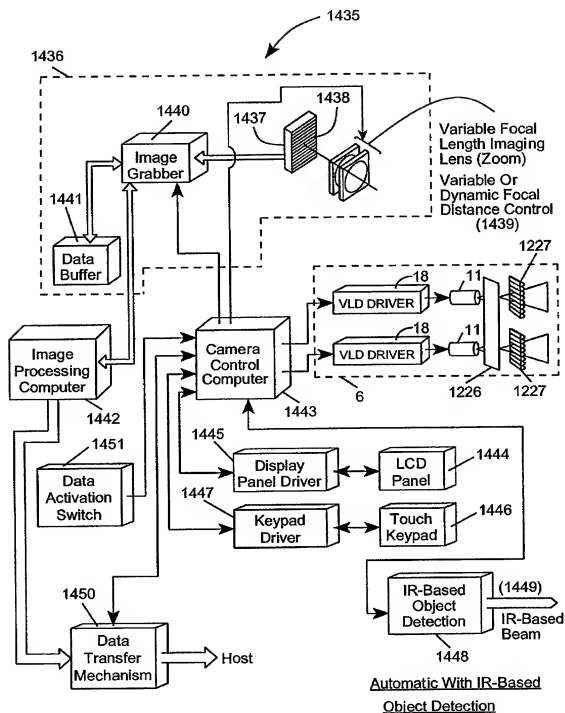


FIG. 40C2

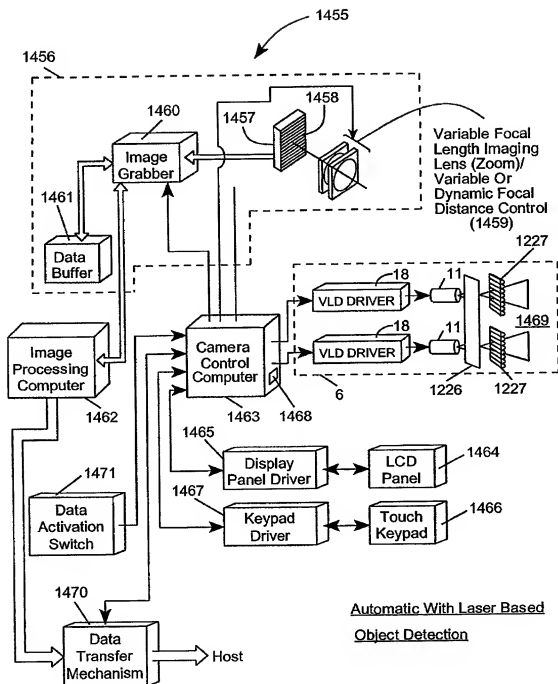


FIG. 40C3

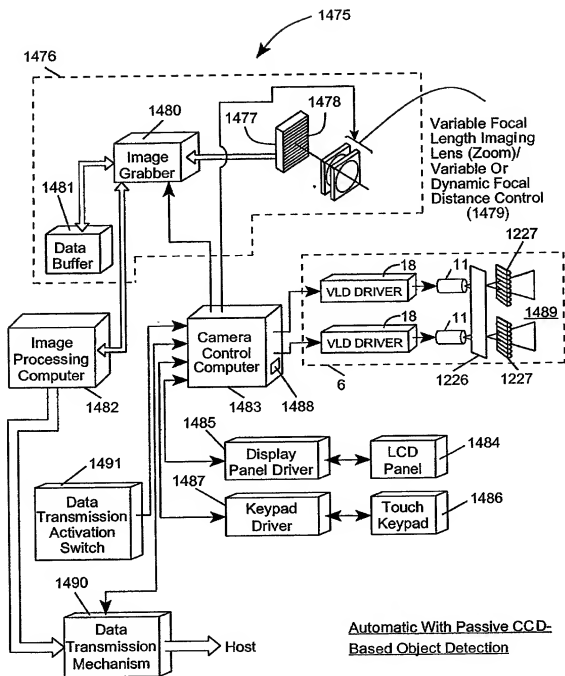


FIG. 40C4

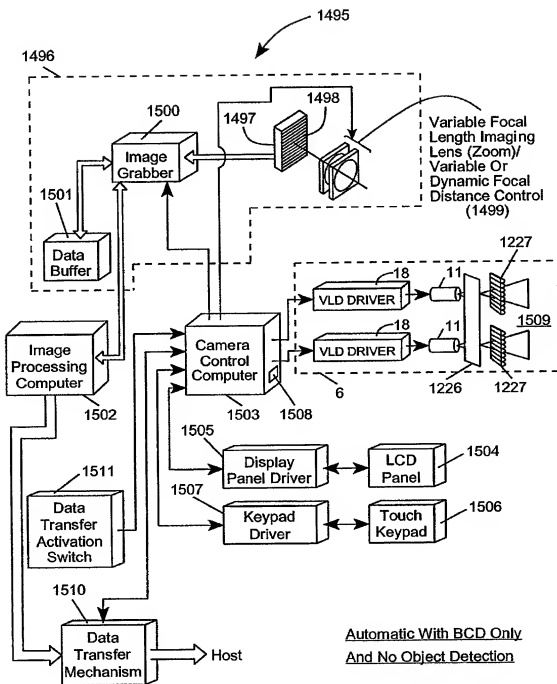
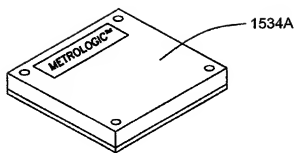


FIG. 40C5





Linear Image Array With
Vertically Elongated Image
Detection Elements

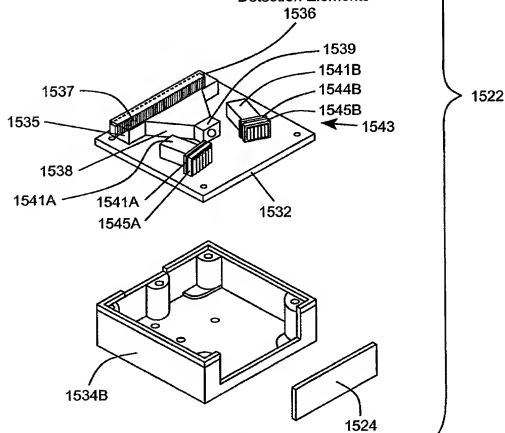


FIG. 41B

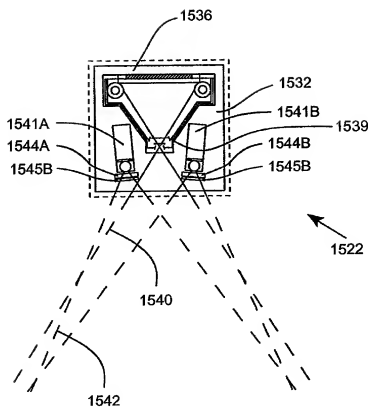


FIG. 41C

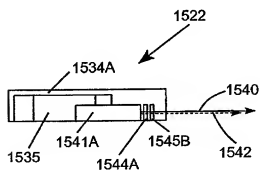


FIG. 41D

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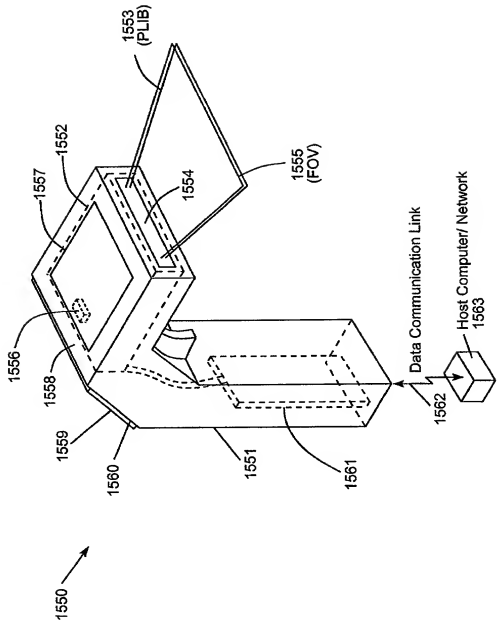


FIG. 42A

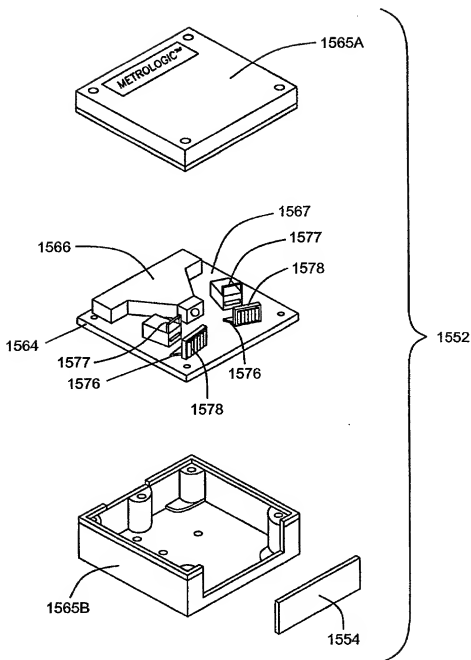


FIG. 42B

1066883 10702

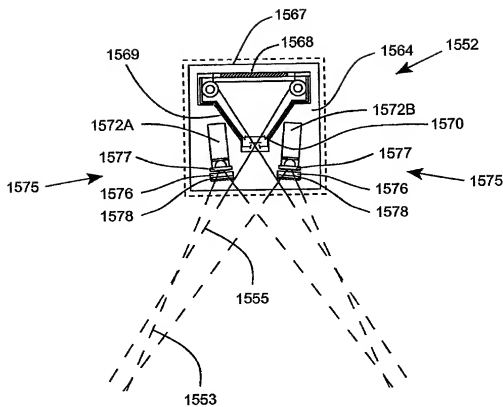


FIG. 42C

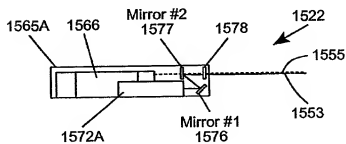


FIG. 42D

202007" E0989001

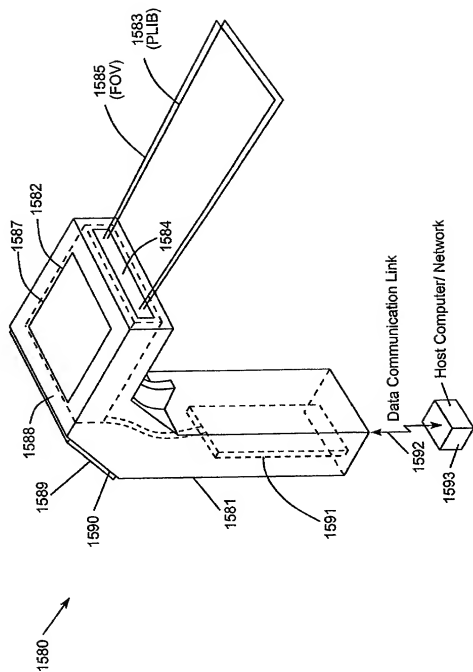


FIG. 43A

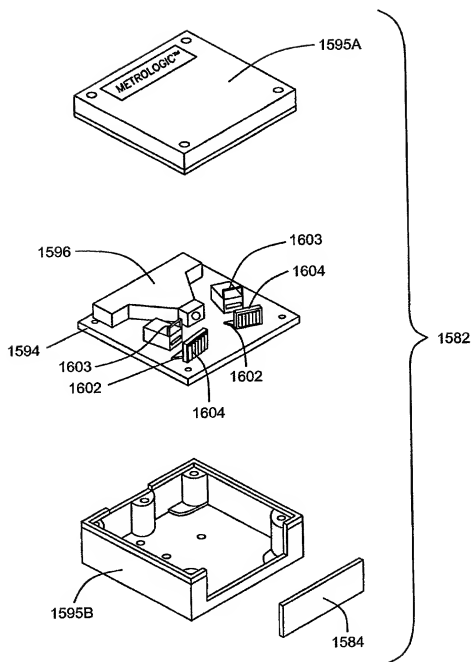


FIG. 43B

10068803.100702

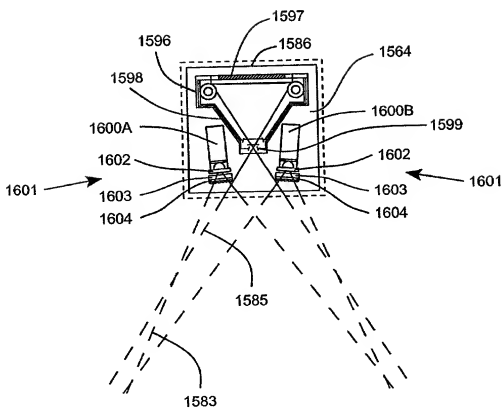


FIG. 43C

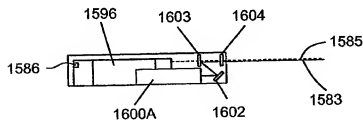


FIG. 43D

202001-0889001

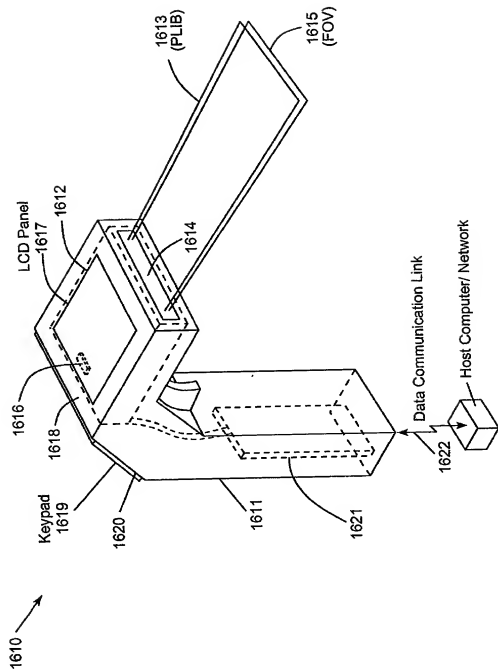


FIG. 44A

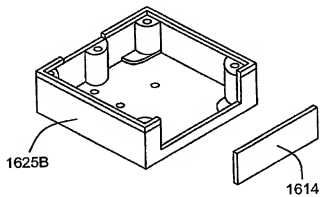
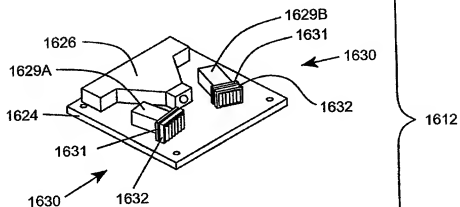
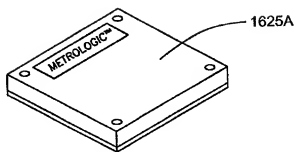


FIG. 44B

10065803 "100702

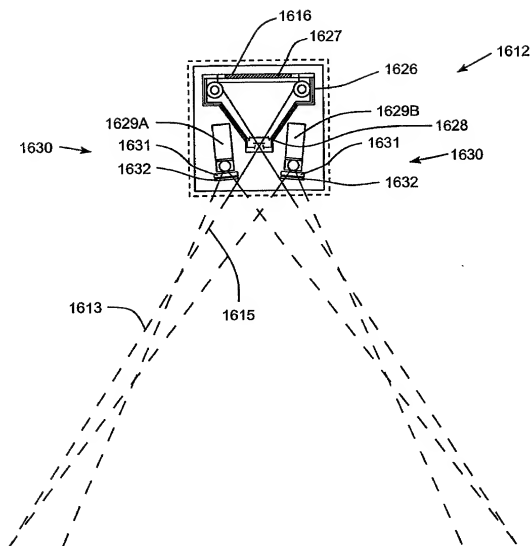


FIG. 44C

1068803.10702

20/00T*E08900T

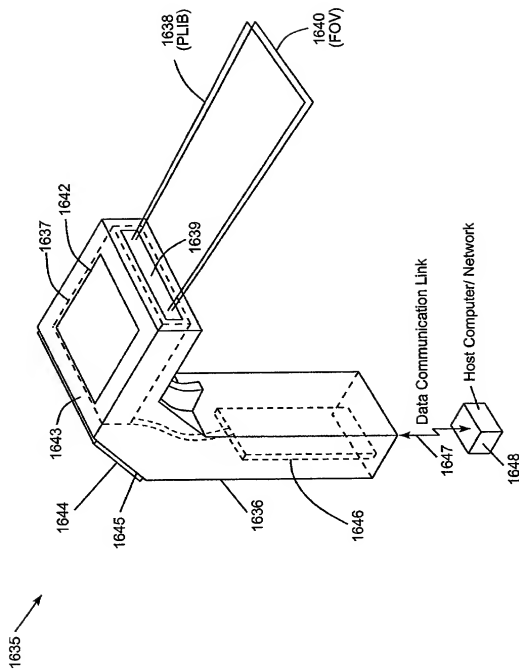


FIG. 45A

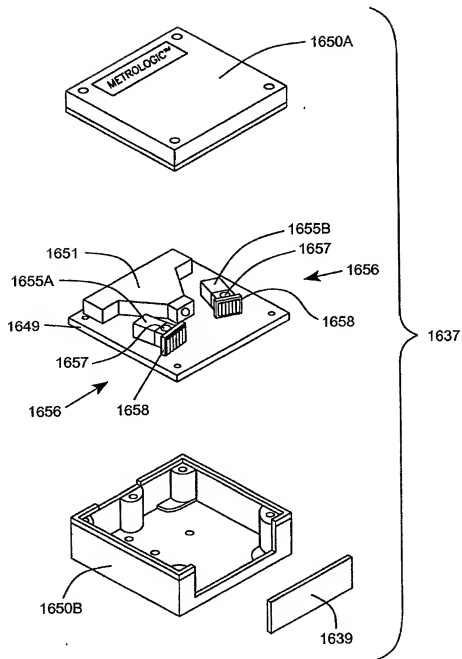
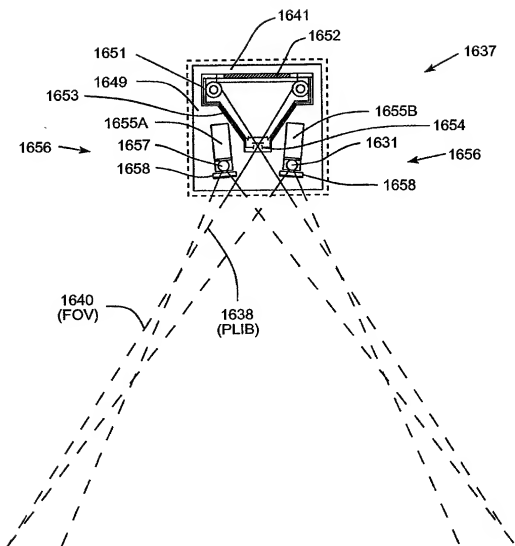


FIG. 45B

10068803.100702



4050702

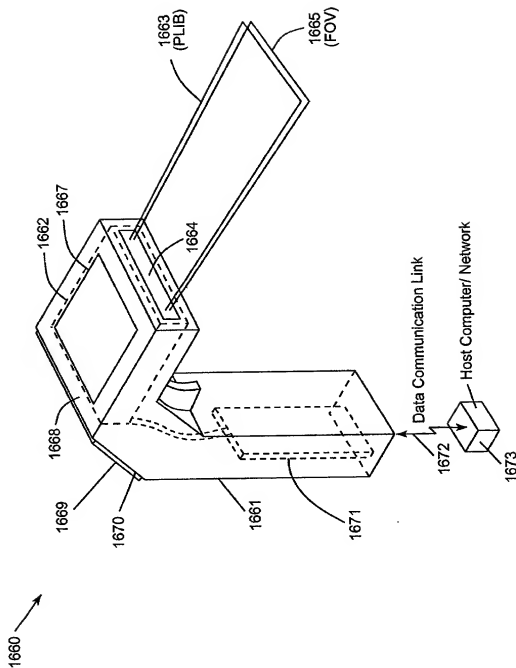


FIG. 46A

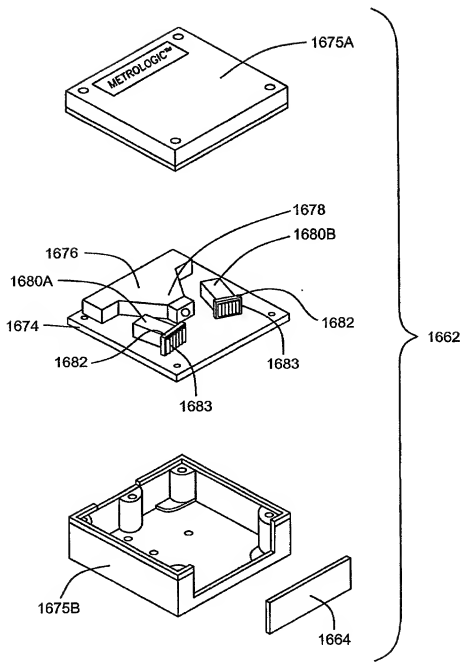


FIG. 46B

10658803.100702

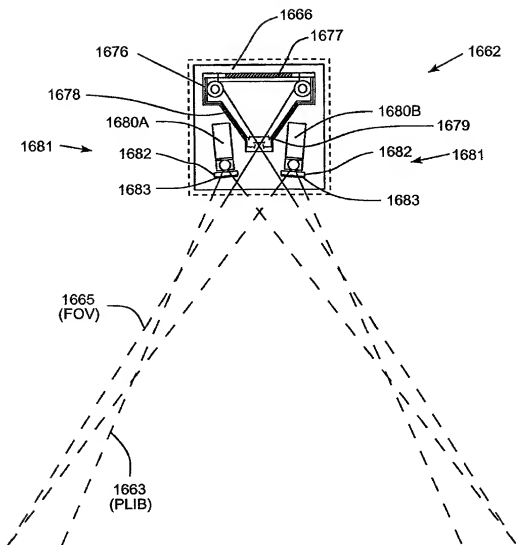


FIG. 46C

1068803.10702

202007'E0889001

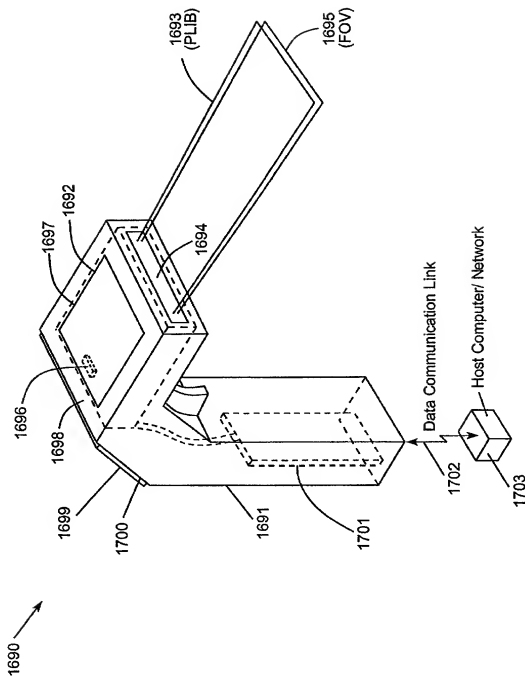
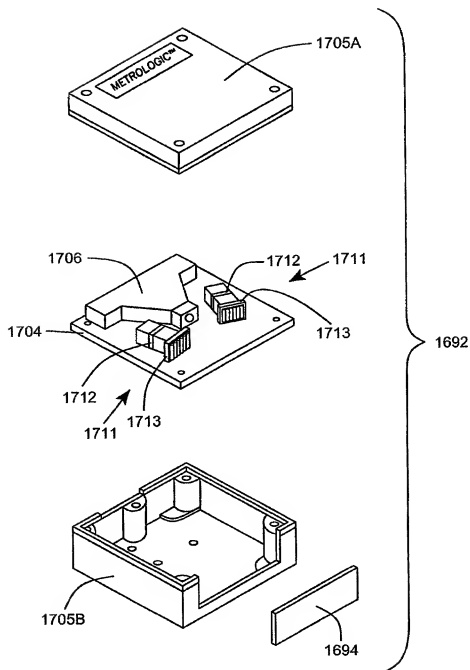
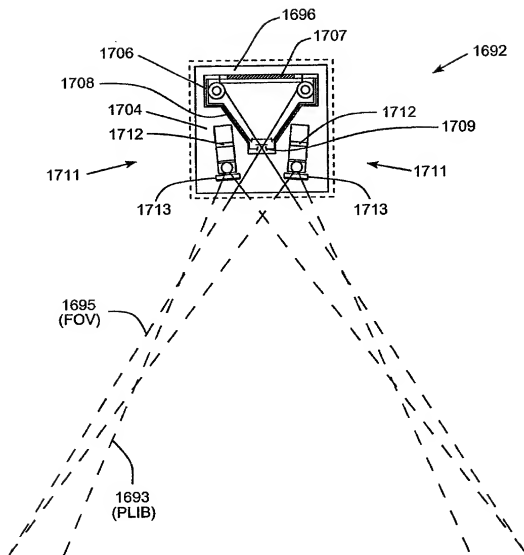


FIG. 47A



10068803, 100702





10068803, 100702

2007-07-07 10:00

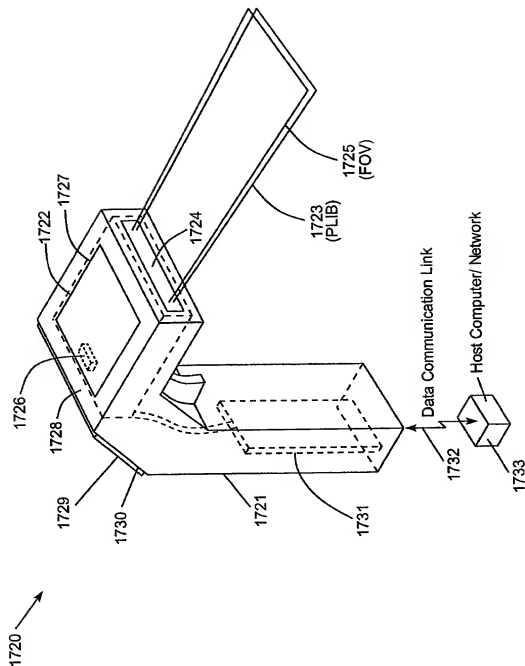


FIG. 48A

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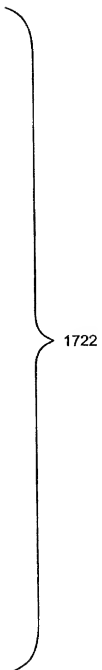
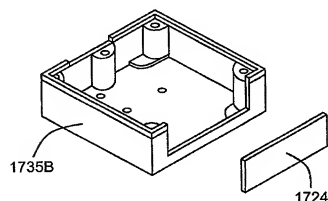
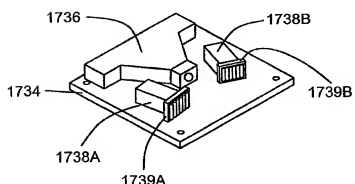
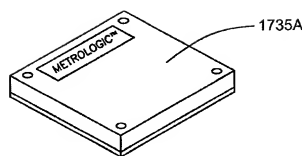


FIG. 48B

200207100702

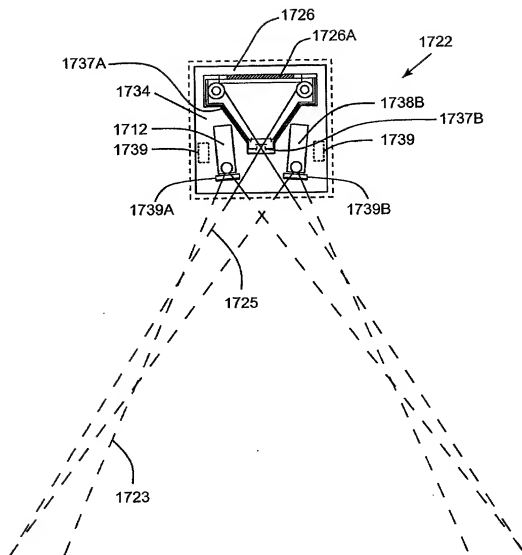


FIG. 48C

10068803, 100702

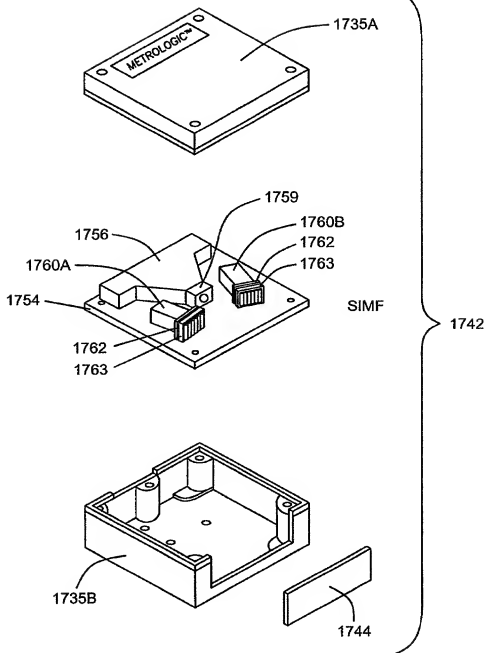


FIG. 49B

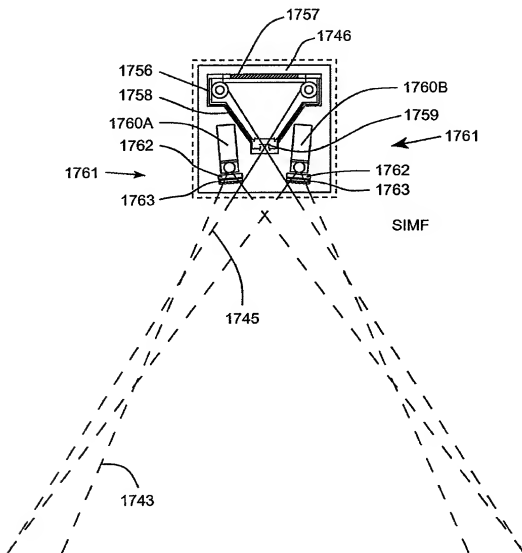


FIG. 49C

10068803.10702

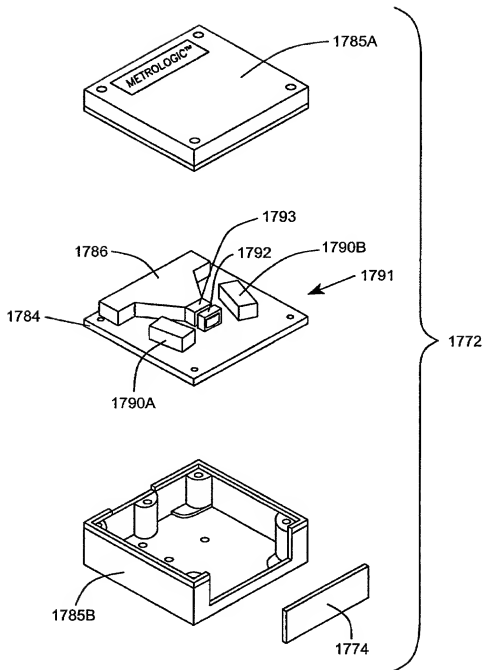


FIG. 50B

1066883-10702

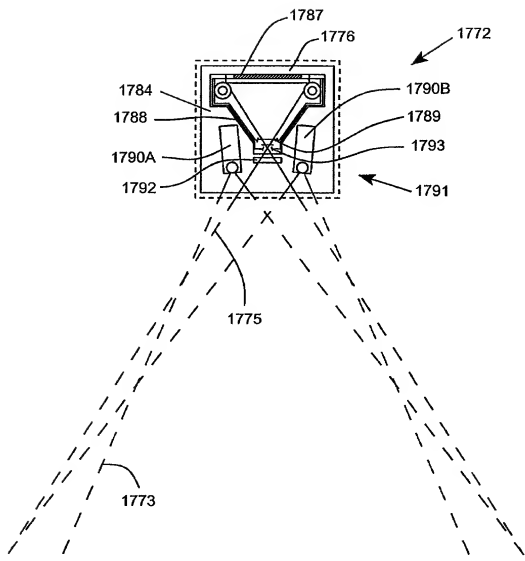


FIG. 50C

10068803.100702

20/00T*008900T

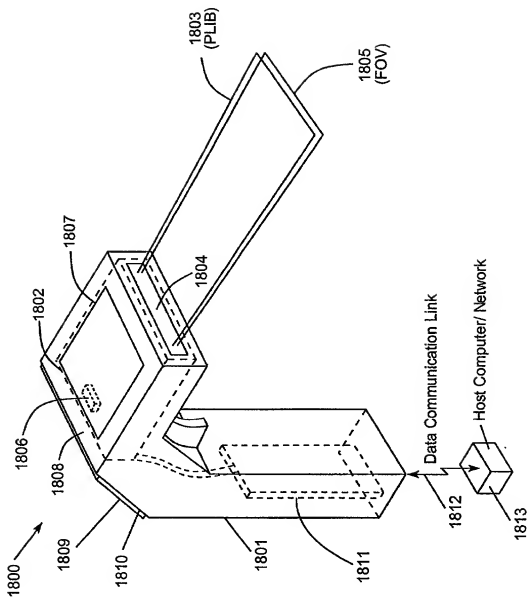


FIG. 51A

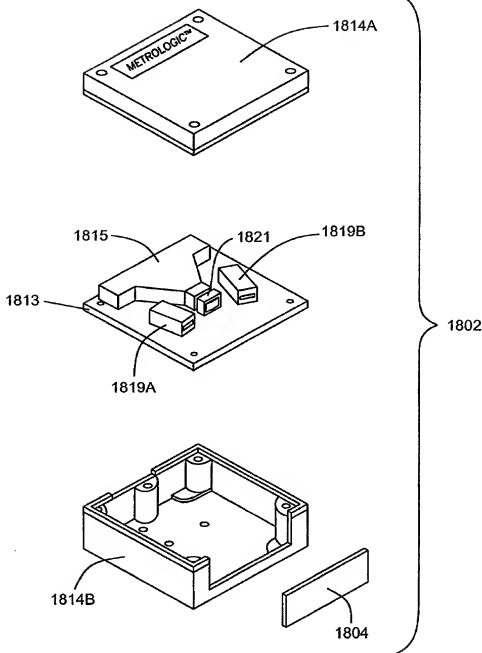


FIG. 51B

10088803.100702

10068803, 100702

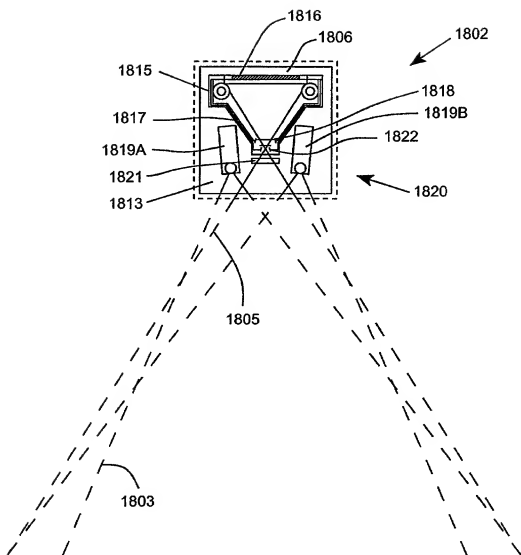


FIG. 51C

200001-5089001

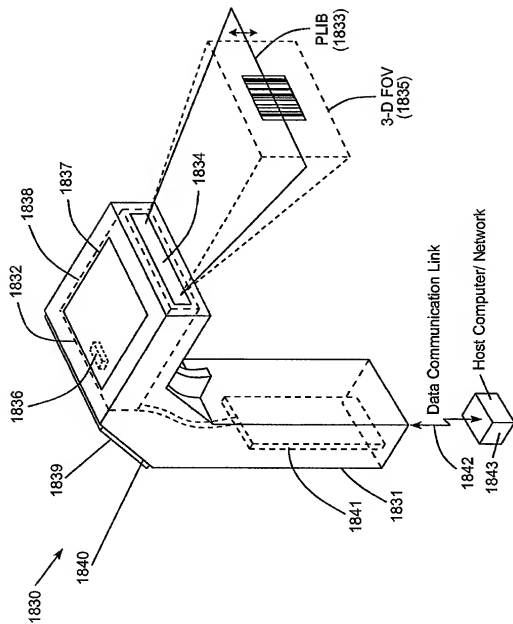


FIG. 52A

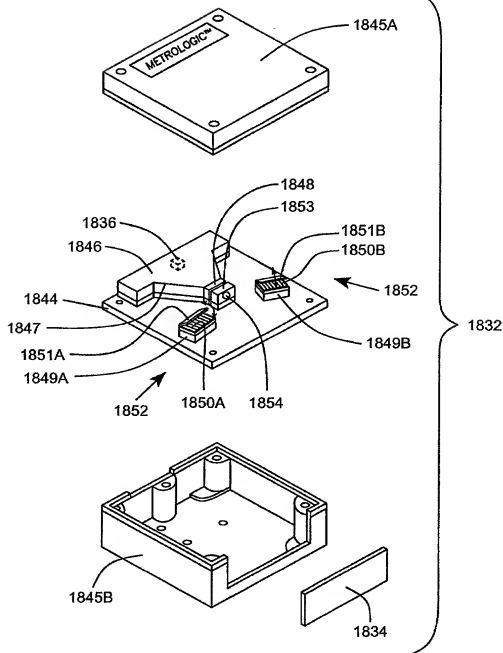


Fig. 113A-3B

FIG. 52B

10068803-100702

202001*E0899001

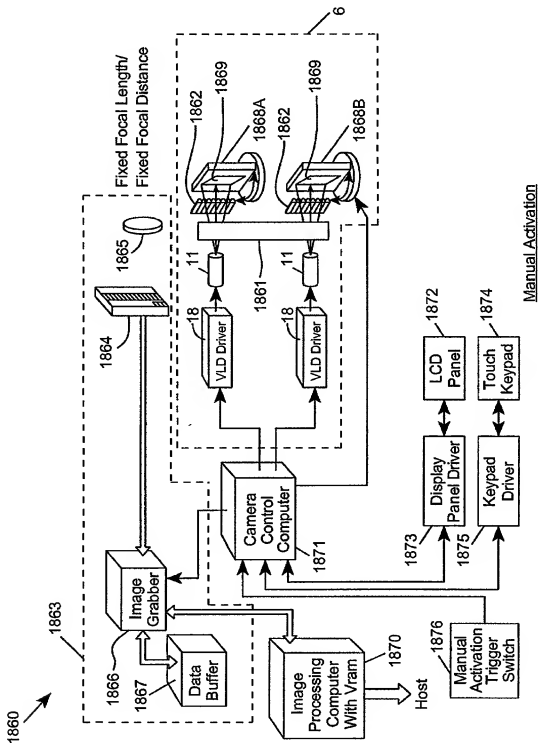


FIG. 53A1

202001*00899001

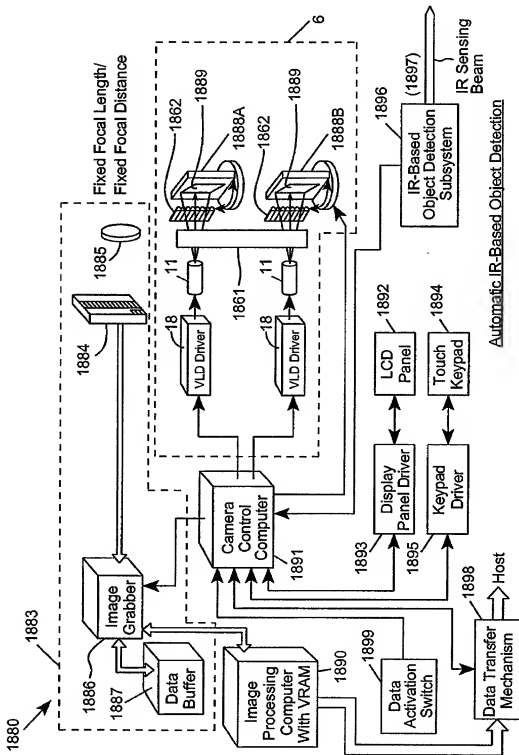
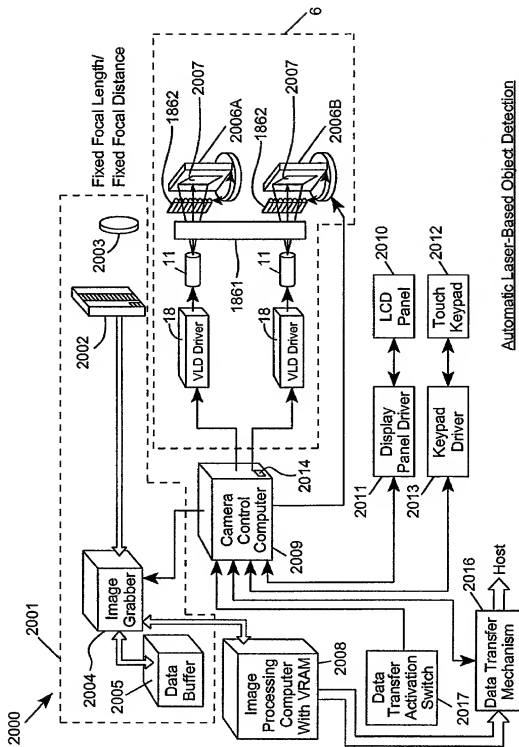


FIG. 53A2

20/00T*E08900T



Automatic Laser-Based Object Detection

FIG. 53A3

202007*50899001

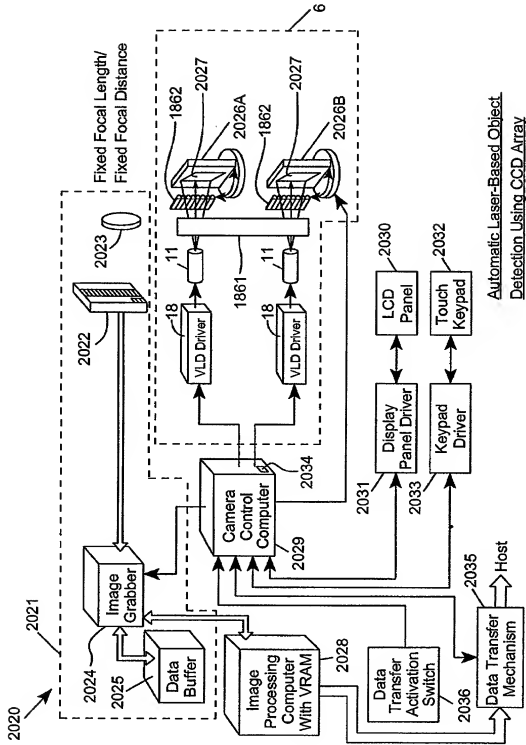


FIG. 53A4

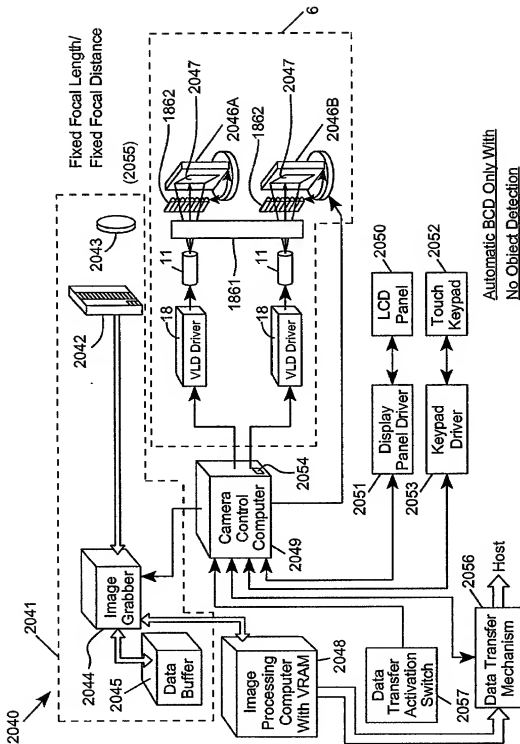


FIG. 53A5

202001*E0899001

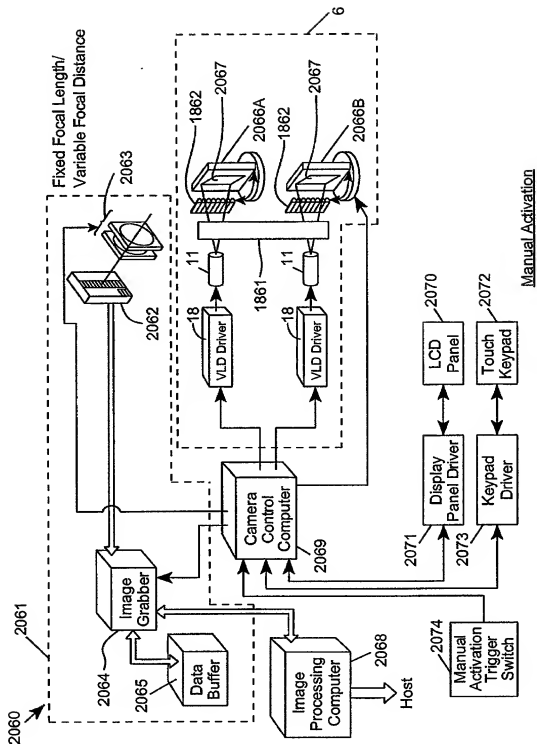


FIG. 53B1

202001*0889007

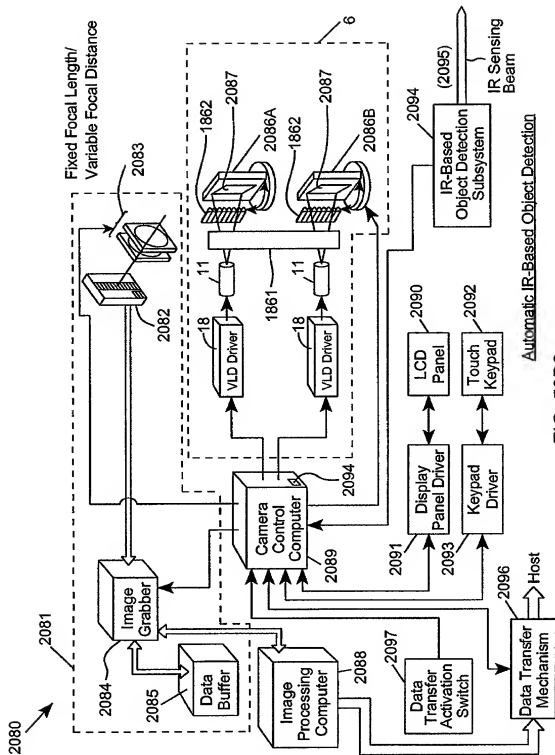
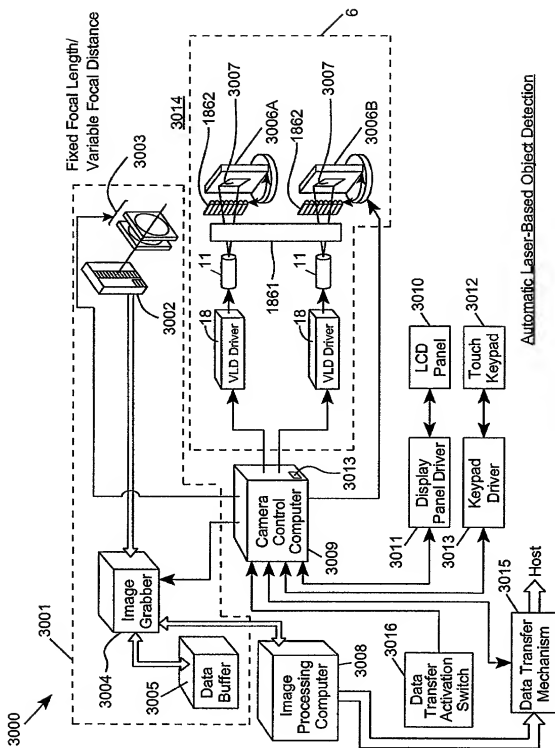


FIG. 53B2

202007" E0893001



2002017-ED883001

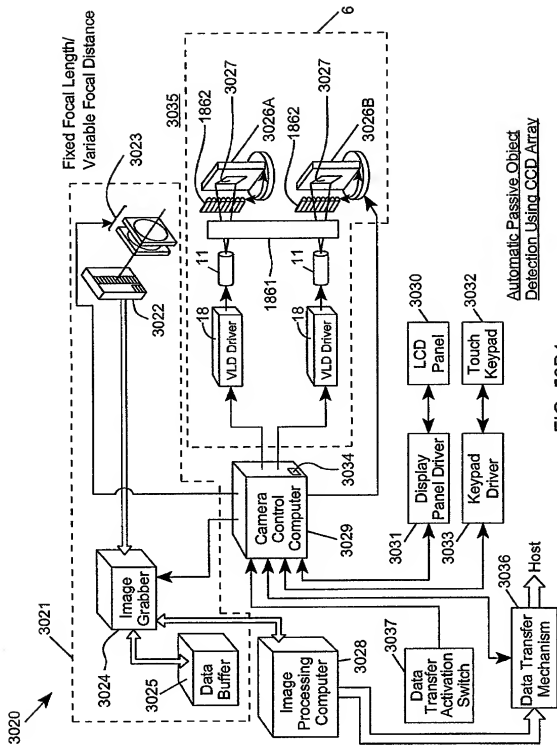
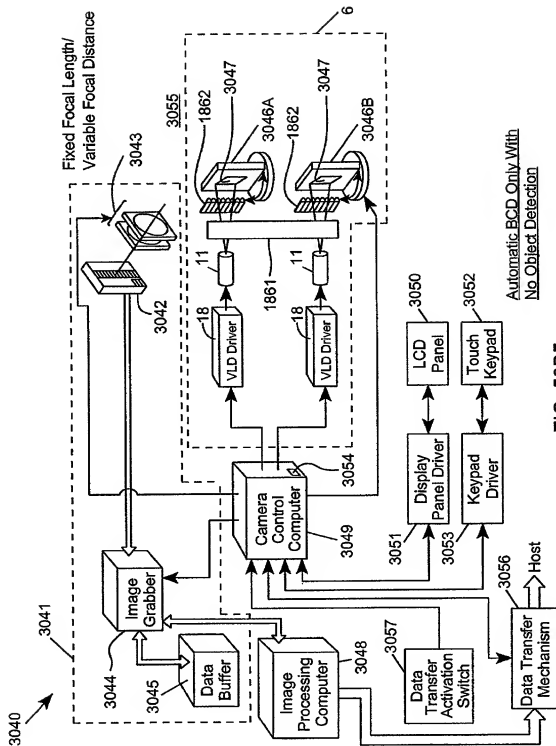


FIG. 53B4



202001*E0989001

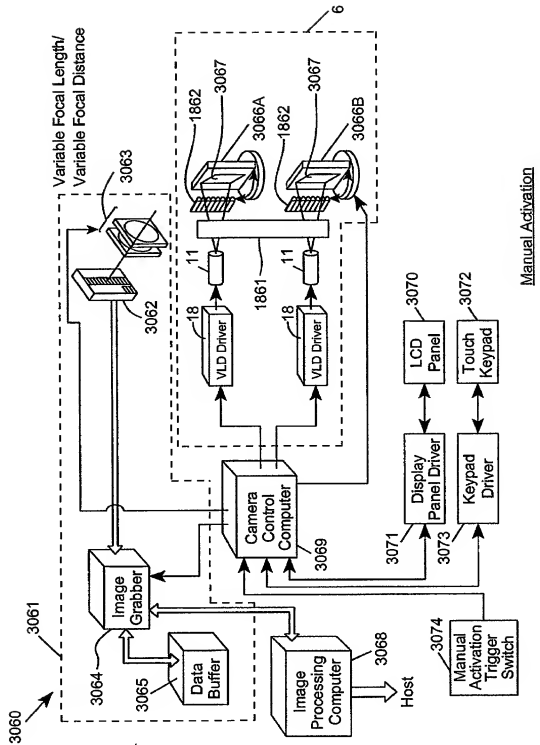


FIG. 53C1

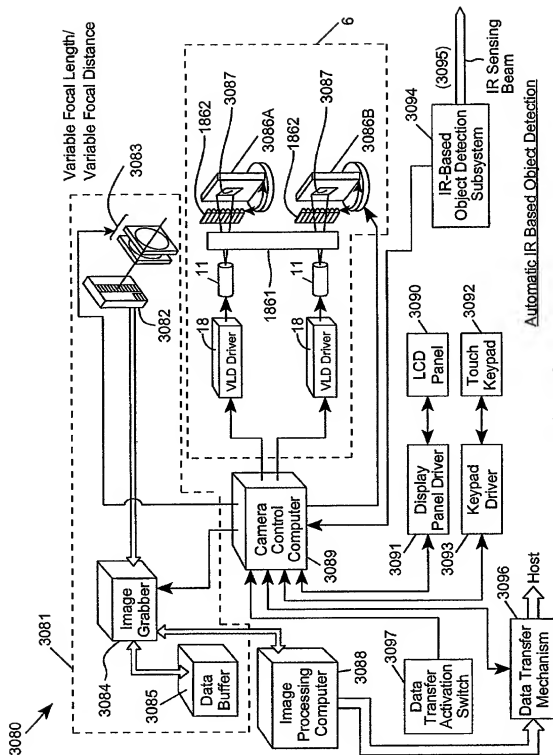


FIG. 53C2

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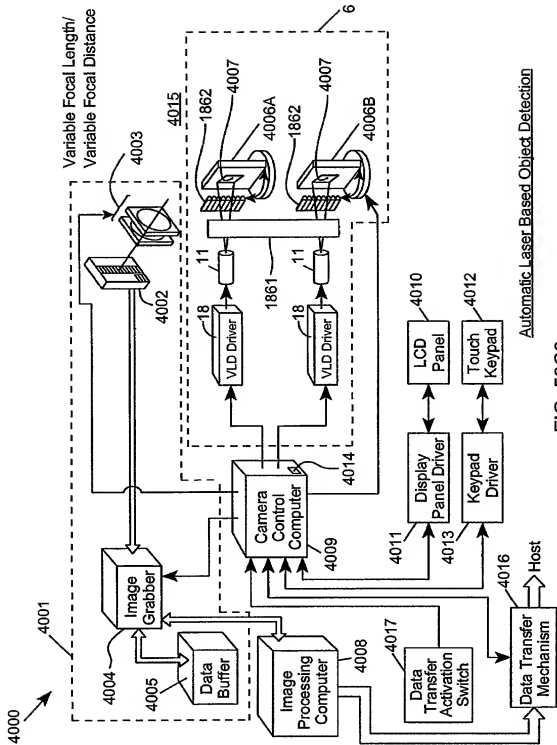


FIG. 53C3

Automatic Laser Based Object Detection

202007" 60890001

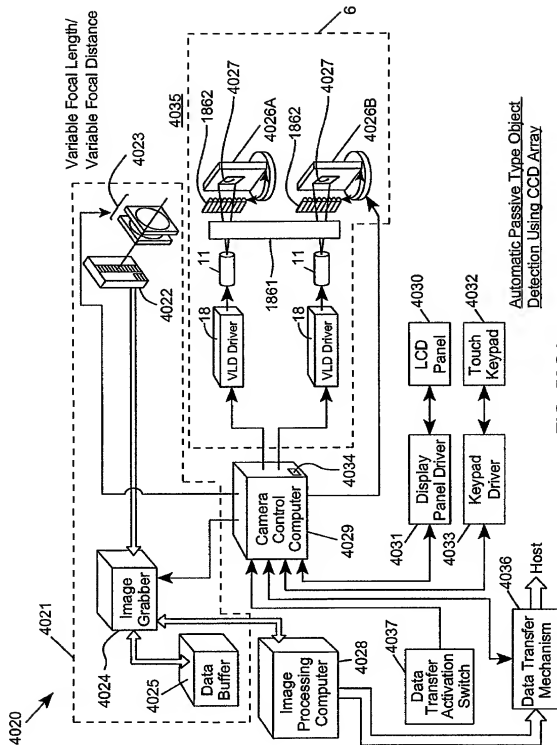


FIG. 53C4

202001-8089001

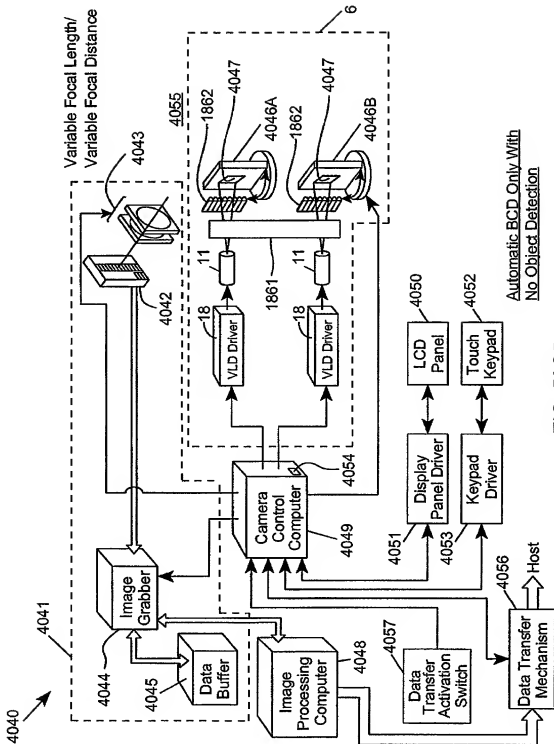


FIG. 53C5

Automatic BCD Only With
No Object Detection

200001-00899001

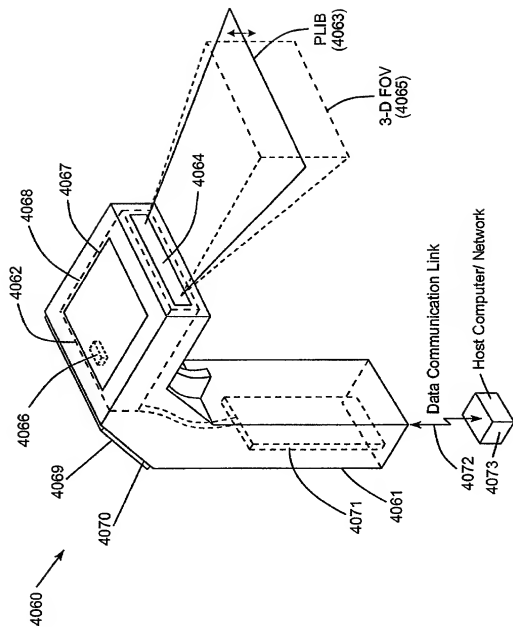
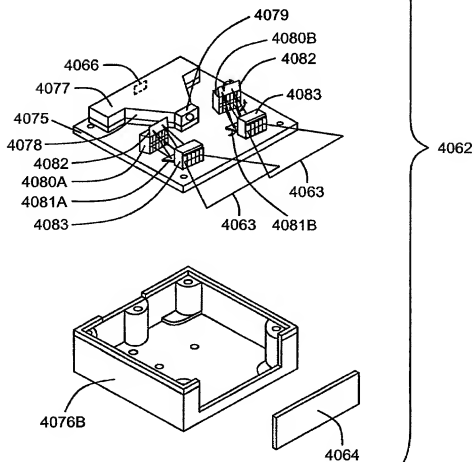
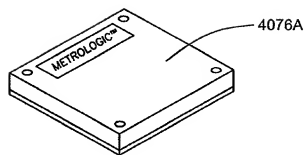


FIG. 54A



(Dual Mirrors)
 Fig. 115A-5D

FIG. 54B

202007-00898007

10088803-10702

202001*208900T

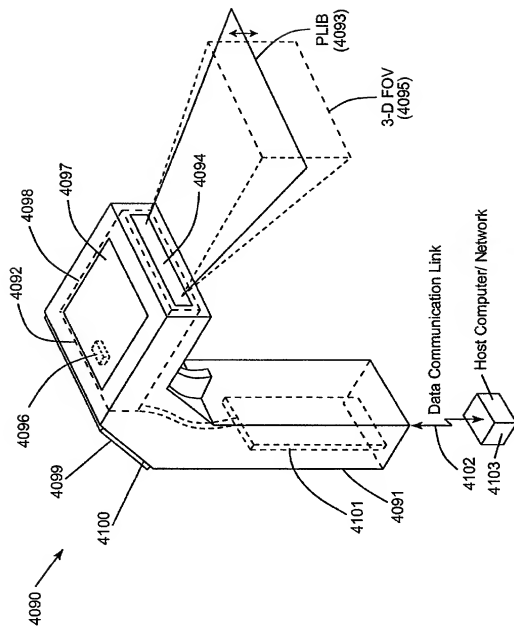


FIG. 55A

10066803.100702

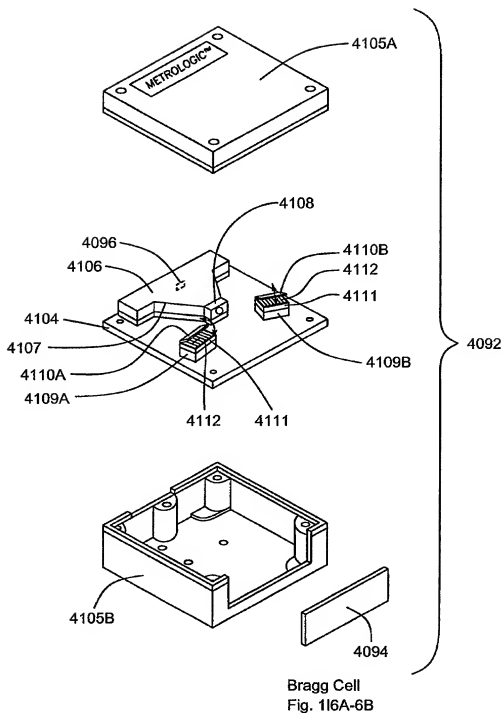


FIG. 55B

2002072000T*E088900T

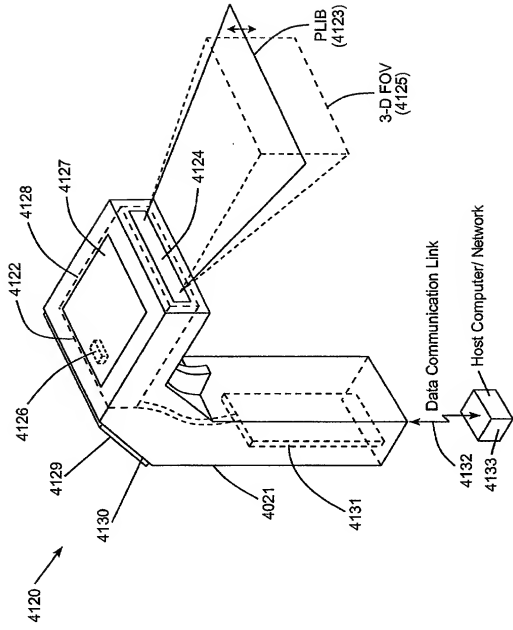
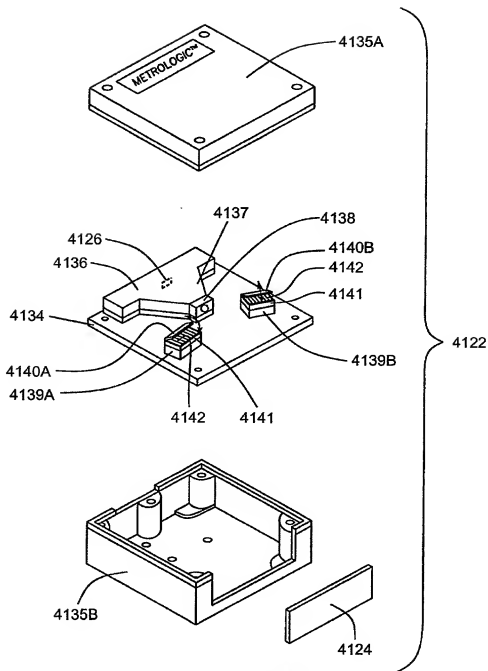


FIG. 56A



DM
Fig. 117A-7B

FIG. 56B

202001*00289001

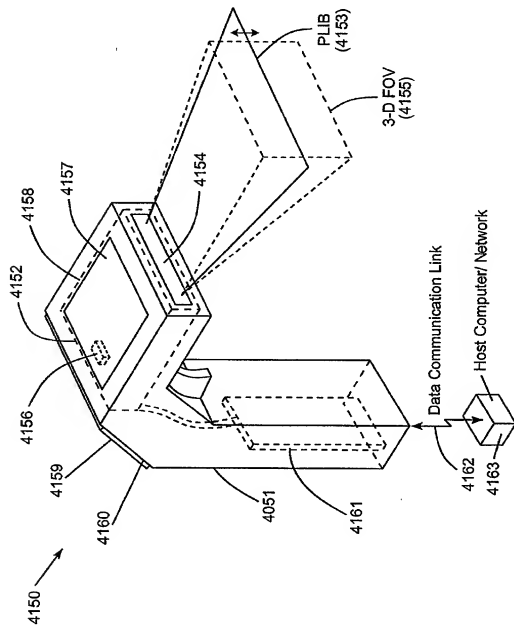
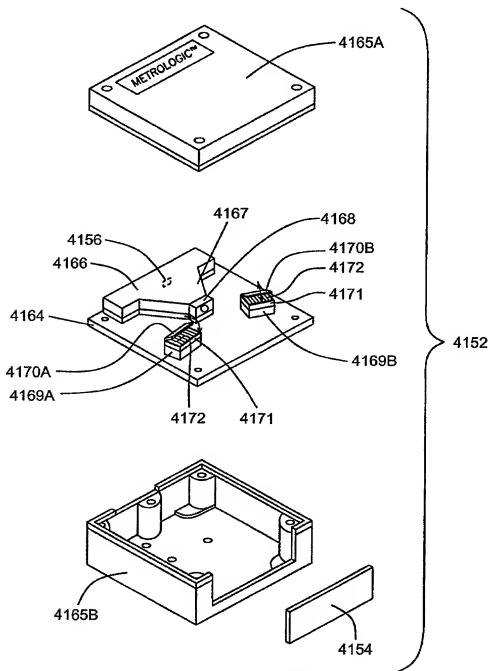


FIG. 57A

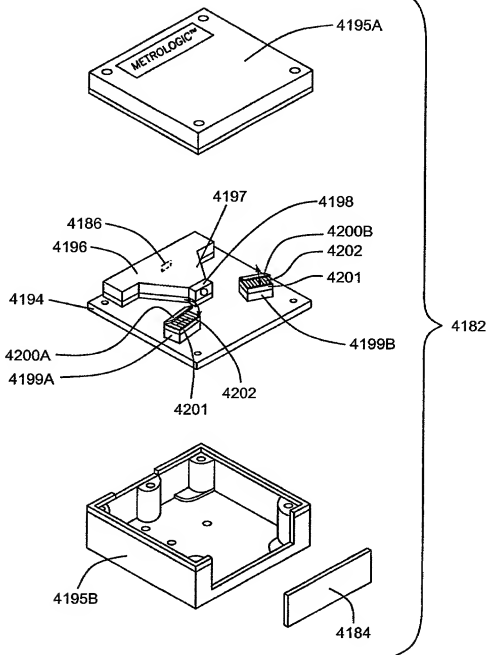
10068303.100702



Phase Only LCD
 PM Panel

Fig. 118F-8G

FIG. 57B



HS Optical Shutter
Fig. 1114A-14B

FIG. 58B

10068803.100702

2002001-00899001

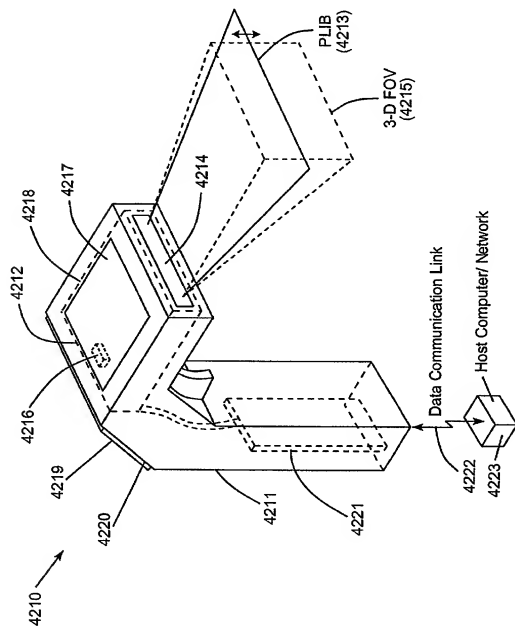
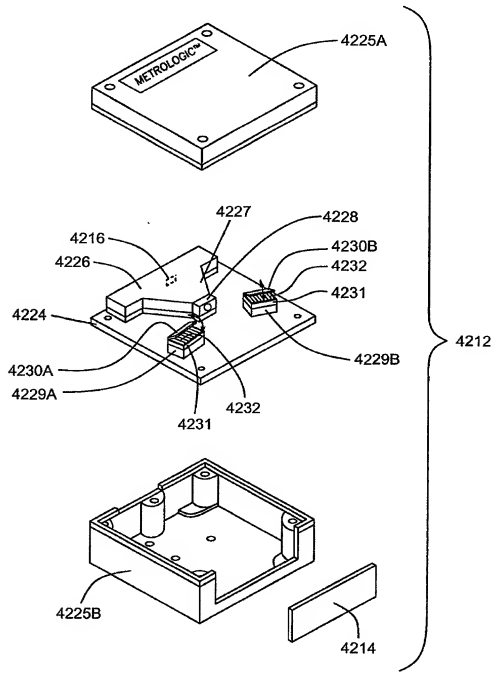


FIG. 59A

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10058803.100702



MLLD
Fig. 1115A-15B

FIG. 59B

202007*0089001

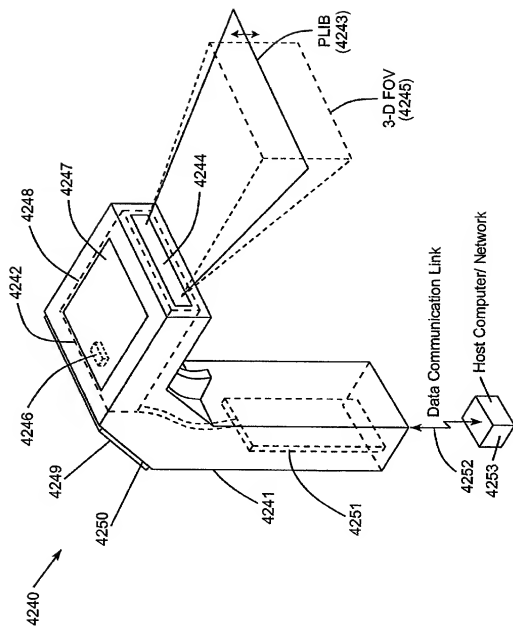
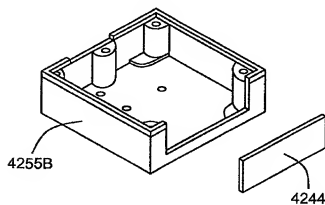
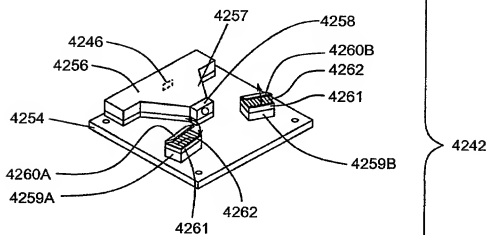
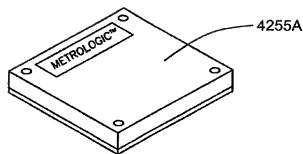


FIG. 60A



Etalon (Temp. Phase Mod.)
 Fig. 1117A-17B

FIG. 60B

10068803-100702

20200170089001

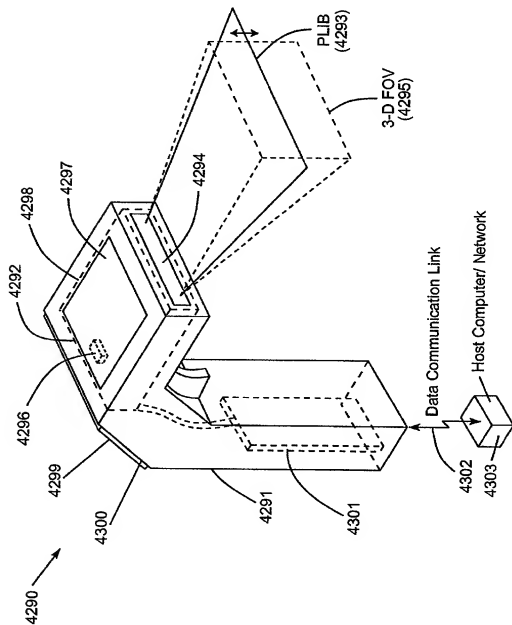
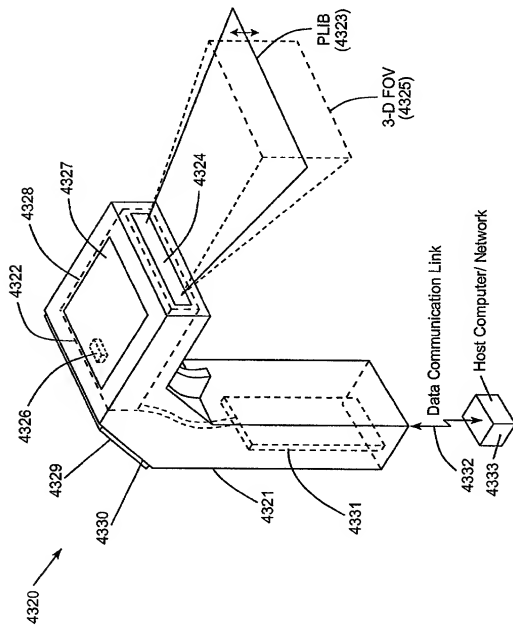
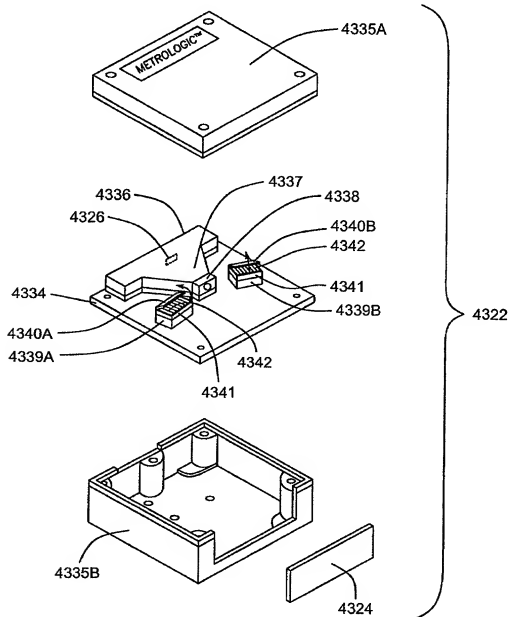


FIG. 61A

20/00T" EDB8900T





Micro-oscillating
 Spatial Intensity
 Modulation Panels
 Fig. 1121A-21D

FIG. 62B

202007-ED899001

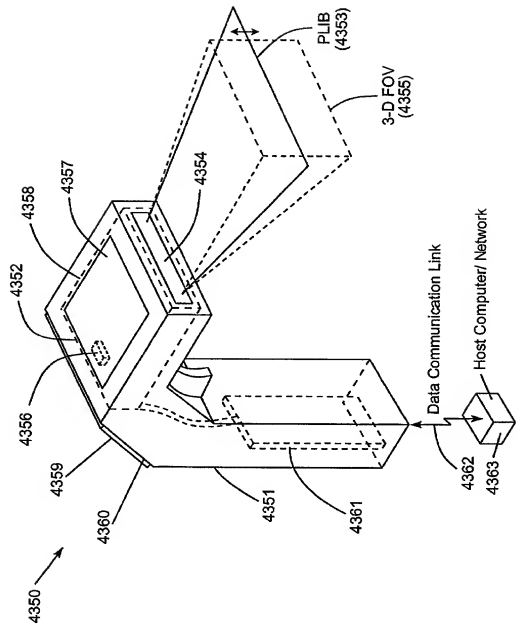
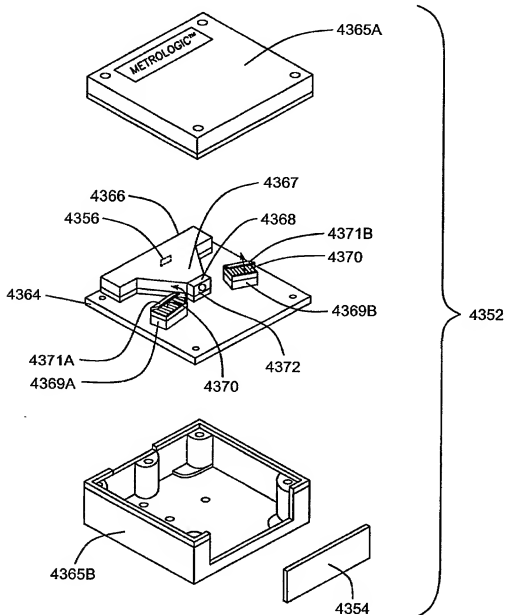


FIG. 63A



EO or Mechanically
Rotating Iris
Fig. 1123A-23B

FIG. 63B

10068803-100702

202001*6089001

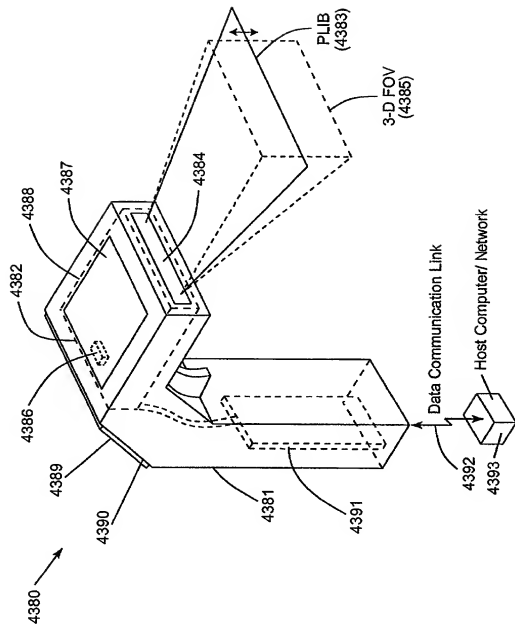
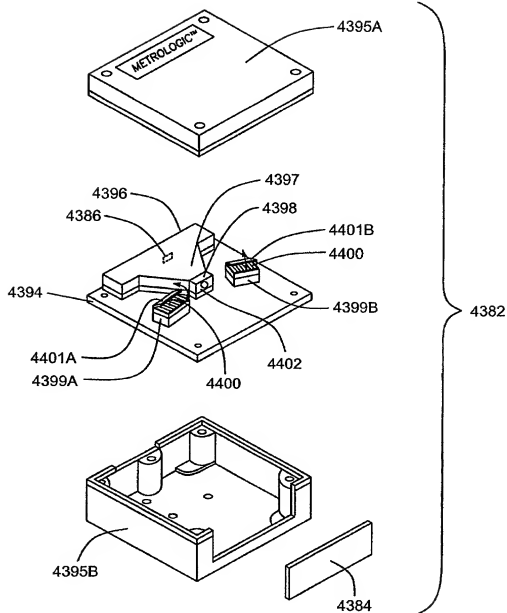


FIG. 64A



E-optical Shutter
Before IFD Lens
Fig. 1124A

FIG. 64B

10068603-100702

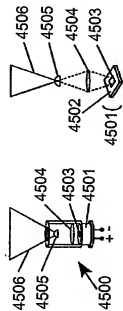


FIG. 65A

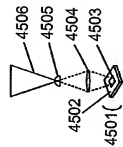


FIG. 65B

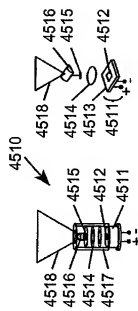


FIG. 66A

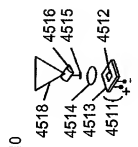


FIG. 66B

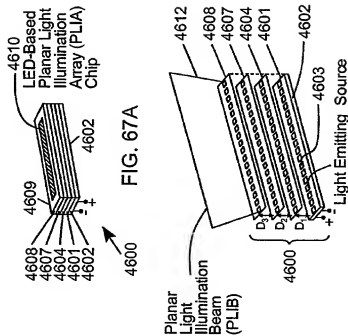


FIG. 67A

FIG. 67B

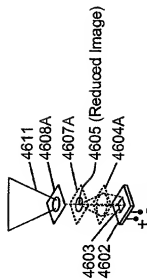


FIG. 67C

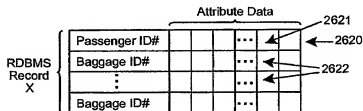
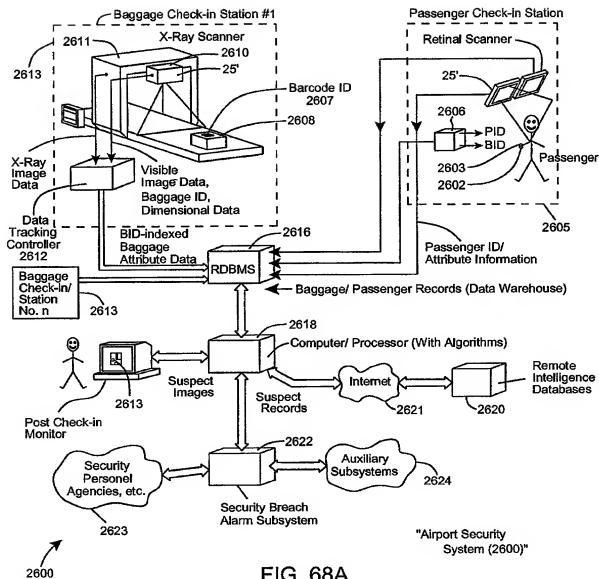


FIG. 68B